

DENSO

Barcode Handy Scanner

AT20B-SM

AT21B-SM

User's Manual

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Preface

Thank you for using the AT20B / AT21B DENSO WAVE Barcode Handy Scanner.

Please read through this manual carefully. It will enable you to operate your scanner correctly.

After you have finished reading this manual, keep it handy for speedy reference.

Note: Do not use this scanner in an environment with electrical noise that can trigger malfunction.

- DENSO WAVE INCORPORATED does not assume any product liability arising out of, or in connection with, the application or use of any product, circuit, or application described herein.
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Customer Registration and Inquiries

Customer Registration

To allow us to provide our customers with comprehensive service and support, we request that all customers complete a Member Registration Form. Registered members will be offered the following privileges.

- Latest upgrade information
- Free exhibition and event information for new products
- Free web-information service “QBdirect”

QBdirect Service Contents

Information search service (FAQ)	Offers detailed information on each product.
Download service	Offers downloads of repair modules for the latest AT20B Series systems or software, and sample programs.
E-mail inquiries	Allows customers to send product-related queries by e-mail.

Please note that these privileges may be subject to change without prior notice.

How to Register

Access the URL below and follow the instructions provided.

<http://www.qbdirect.net>

SAFETY PRECAUTIONS

Be sure to observe all these safety precautions.

- Please READ through these instructions carefully. They will enable you to use the scanner correctly.
- Always keep this manual nearby for speedy reference.

Strict observance of these warnings and cautions is a MUST for preventing accidents that could result in bodily injury and substantial property damage. Make sure you fully understand all definitions of these terms and symbols given below before you proceed to the text itself.

	WARNING	Alerts you to those conditions that could cause serious bodily injury or death if the instructions are not followed correctly.
	CAUTION	Alerts you to those conditions that could cause minor bodily injury or substantial property damage if the instructions are not followed correctly.

Meaning of Symbols



A triangle (△) with a picture inside alerts you to a warning of danger. Here you see the warning for electrical shock.



A diagonal line through a circle (⊘) warns you of something you should not do; it may or may not have a picture inside. Here you see a screwdriver inside the circle, meaning that you should not disassemble.



A black circle (●) with a picture inside alerts you to something you MUST do. This example shows that you MUST unplug the power cord.

⚠ WARNING

	To System Designers: When introducing the scanner in those systems that could affect human lives (e.g., medicines management system), develop applications carefully through redundancy and safety design which avoids the feasibility of affecting human lives even if a data error occurs.
	- Never bring any metals into contact with the terminals in connectors. Doing so could produce a large current through the scanner, resulting in heat or fire, as well as damage to the scanner. - Keep the AC adapter away from water. Failure to do so could cause fire or electrical shock. - Never use the scanner on the line voltage other than the specified level. Doing so could cause the scanner to break or burn. - Do not use the scanner where any inflammable gases may be emitted. Doing so could cause fire. - Do not scratch, modify, bend, twist, pull, or heat the power cable of the AC adapter. Do not place heavy material on the cable or allow the cable to get pressed under heavy material. Doing so could break the cable, resulting in a fire. - Do not subject the reading window of the scanner to direct sunlight for extended periods. Doing so could damage the scanner, resulting in a fire.
	- If smoke, abnormal odors or noises come from the scanner, immediately switch off the host computer, disconnect the AC adapter and the interface cable, and contact your nearest dealer. Failure to do so could cause fire or electrical shock. - If foreign material or water gets into the scanner, immediately unplug the AC adapter and the interface cable, and contact your nearest dealer. Failure to do so could cause fire or electrical shock. - If you drop the scanner so as to affect the operation or damage its housing, switch off the host computer, unplug the AC adapter and the interface cable, and contact your nearest dealer. Failure to do so could cause fire or electrical shock.

⚠ CAUTION

 Never disassemble	• Never disassemble or modify the scanner; doing so could result in an accident such as break or fire. Doing so could result in a fire or electrical shock.
	• Do not put the scanner on an unstable or inclined plane. The scanner may drop, creating injuries. • Never put the scanner in places where there are excessively high temperatures, such as inside closed-up automobiles, or in places exposed to direct sunlight. Doing so could affect the housing or parts, resulting in a fire. • Avoid using the scanner in extremely humid areas, or where there are drastic temperature changes. Moisture will get into the scanner, resulting in malfunction, fire or electrical shock. • Do not place the scanner anywhere where it may be subjected to oily smoke or steam, e.g., near a cooking range or humidifier. Doing so could result in a fire or electrical shock. • Never cover or wrap up the scanner or AC adapter in a cloth or blanket. Doing so could cause the unit to heat up inside, deforming its housing, resulting in a fire. Always use the scanner and AC adapter in a well-ventilated area. • Keep the power cable of the AC adapter away from any heating equipment. Failure to do so could melt the sheathing, resulting in a fire or electrical shock. • Do not scratch or modify the scanner or its interface cable. Do not bend, twist, pull, or heat the cable. Doing so could damage the scanner or its interface cable, creating a fire hazard. • Do not put heavy material on the scanner or its interface cable, or allow the cable to get pressed under heavy material. • Do not look into the light source from the reading window or do not point the reading window at other people's eyes. Eyesight may be damaged by direct exposure to this light. • Do not use the scanner if your hands are wet or damp. Doing so could result in an electrical shock. • Never use chemicals or organic solvents such as benzene and thinner to clean the housing. Do not apply insecticide to the scanner. Doing so could result in a marred or cracked housing, electrical shock or fire. • Do not use the scanner with anti-slip gloves containing plasticizer. The scanner housing may be broken, creating injuries, electrical shock, or fire. • Do not use or store the scanner in the place where strong magnetism or static electricity are likely produced near the processing machine or on the carpet. Doing so could affect the parts, resulting in malfunction or failure.

CAUTION



- When disconnecting the AC adapter from the wall socket, hold the AC adapter body not the power cable.
The power cable may be broken, resulting in a burnt AC adapter, electrical shock, or fire.
- If the interface cable is damaged (e.g., exposed or broken lead wires), stop using it and contact your nearest dealer.
Failure to do so could result in a fire or electrical shock.



- During electrical storm activity, always unplug the AC adapter from the wall socket.
Exposure to power surges could result in a damaged scanner or fire.
- When taking care of the scanner, unplug the AC adapter from the wall socket for safety.
Failure to do so could result in an electrical shock.
- Do not drop the scanner.
The scanner housing may be broken, creating injuries.
Using the scanner whose housing is broken could result in smoke or fire.
Unplug the AC adapter from the wall socket and contact your nearest dealer.

Care and Maintenance

■ Proper Care of the reading window

Dust or dirt accumulating on the clear plate of the barcode reading window will affect reading performance. If you use the scanner in dusty areas, therefore, periodically check the clear plate and clean it if dusty.

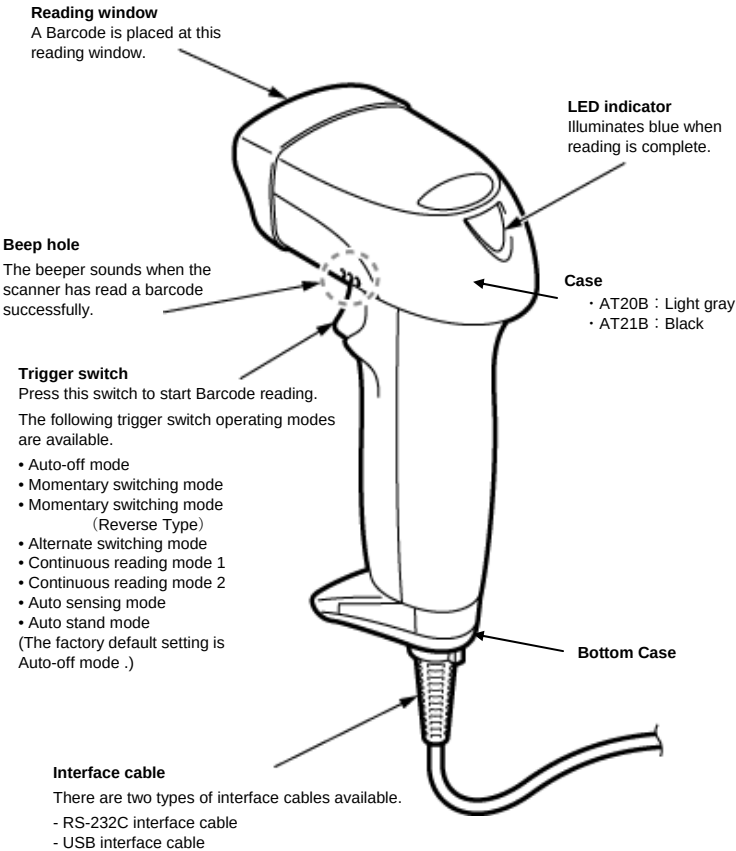
- To clean the plate, first blow the dust away with an airbrush. Then wipe the plate with a cotton swab or the similar soft one gently.
- If sand or hard particles have accumulated, never rub the plate; doing so will scratch or damage it. Blow the particles away with an airbrush or a soft brush.

■ Proper Care of the Scanner body

Wipe any dirt from the Scanner body with a dry, soft cloth.

- Note -

- Never use substances such as benzene or alcohol, as this may cause the housing to be marred or paint to peel off.
 - If excessively dirty, wipe a soft cloth that has been soaked in soapy water (always use neutral detergent) and wrung out thoroughly.
-



Note: The bottom case is not securely held in the scanner case when the interface cable and its connector case cover are not plugged into the case. If the bottom case comes off, fit it firmly in the scanner case again, and connect the interface cable and then the connector cover over it.

Chapter 2 Preparation

2.1 Operating Environment for the Use of USB Interface

Using the scanner via the USB interface requires a host computer equipped with a USB port. The operating environment differs depending upon whether you use the USB-COM interface or USB keyboard interface as listed below.

USB keyboard interface:

No dedicated USB device driver is required. Via this interface, data scanned by the scanner can be entered to the cursor position in your application. For instructions on how to set up the driver, refer to Chapter 3, Section 3.2.2. For the interface specifications, refer to Chapter 9, Section 9.3.

This interface is selected by default.

USB-COM interface:

To use this interface, you need to install the dedicated Active USB-COM port driver (virtual COM port driver) to the host computer. This interface allows you to use the scanner in applications using the conventional serial port. For instructions on how to set up the driver, refer to Chapter 3, Section 3.2.1. For the interface specifications, refer to Chapter 9, Section 9.2.

	To use the USB-COM interface:	To use the USB keyboard interface (factory default):
Host computer	PC/AT or AT/AT compatible PC equipped with a USB port	
Operating System (OS)	Windows XP, x32 Edition Windows Vista, x32 Edition Windows 7, x32 Edition and x64 Edition	
USB driver	Active USB-COM port driver provided by DENSO WAVE	OS-supplied device driver

Note: The scanner cannot be used on Windows NT that does not support any USB device.

Switching between the USB-COM interface and USB keyboard interface is possible by:

- Using bar coded parameter menu (provided in Chapter 11),
- Using the configuration software (Scanner Setting),* or
- Connecting the scanner's USB interface cable to the host computer or USB hub with the trigger switch being held down. (If the USB-COM interface has been set up, doing so switches to the USB keyboard interface, and vice versa.) (Interface switching when power turned ON is disable by default)

The interface setting will be retained even if the scanner is turned off.

Note: For approx. 20 seconds after switching from the USB-COM interface to the USB keyboard interface, the scanner cannot accept data entry.

* Registered users can download the configuration software (Scanner Setting) from QBdirect, their customer support section on the Denso Wave website at no extra charge.

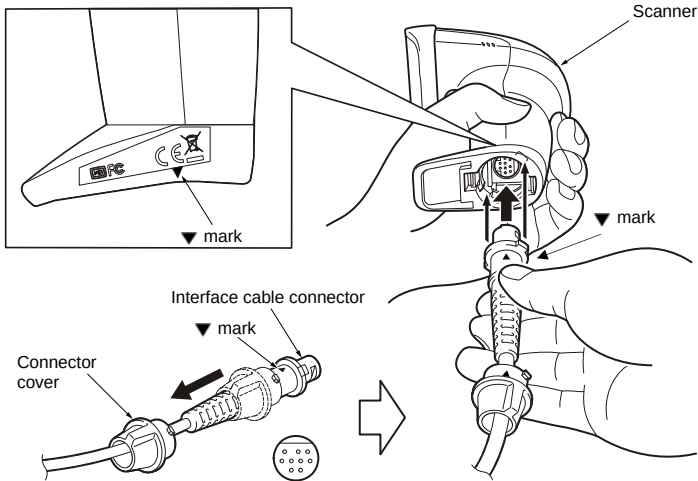
For further details on QBdirect or to register, visit the following URL.

<http://www.qbdirect.net>

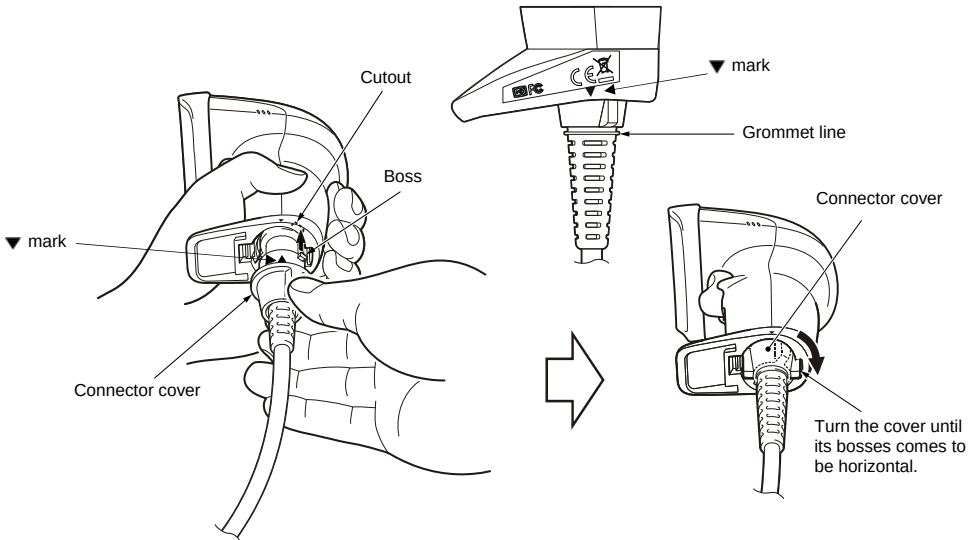
2.2 Connecting the Interface Cable to the Scanner

- (1) Pull the connector cover of the interface cable off its connector as shown below.
- (2) Plug the interface cable connector into the connector located in the bottom of the scanner.

Note: As shown below, hold the scanner body, align the ▼ mark on the cable connector with that on the scanner, and fully insert the interface cable connector.



- (3) Align the ▼ mark on the scanner with that on the connector cover, and fully insert the connector cover to the scanner until the grommet line is shown. Then, turn it clockwise until the boss on the connector cover becomes horizontal against the scanner.

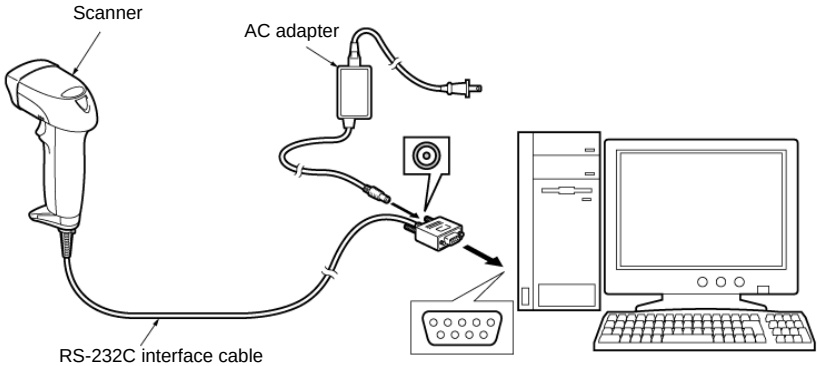


Chapter 3 Connection to the Host Computer

3.1 Using the RS-232C Interface

(1) AC adaptor-powered type

- ① Connect the RS-232C interface cable to the host computer.



- ② Plug the AC adapter into the DC power jack provided in the interface cable connector.

Note: When disconnecting the interface cable or DC power jack, hold the connector housings not the cables. Pulling cables will result in breaks.

Note: Avoid connecting and disconnecting of connectors all if possible. Doing so may result in weak contact.

Note: Be sure to use the adapter exclusively designed for the scanner.

(2) Host computer-powered type

- ① Connect the RS-232C interface cable to the host computer *

- ② Secure the connector if it is equipped with a lock *.

* Refer to the specifications for details of the interface cable connector types, pin assignments and lock facility.

Note: When disconnecting the interface cable or DC power jack, hold the connector housings not the cables. Pulling cables will result in breaks.

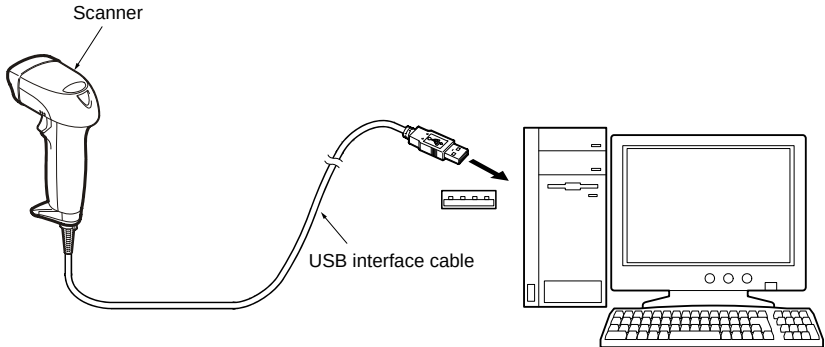
Note: Avoid connecting and disconnecting of connectors all if possible. Doing so may result in weak contact.

3.2 Using the USB Interface

The scanner receives and sends data from/to the host computer through the USB-COM interface or USB keyboard interface. You need to set up the device driver designed for the interface to be used.

Notes for connecting the USB interface cable

- To use the USB-COM interface, you need to install the serial port driver to the host computer before connection of the USB interface cable. For details, refer to Section 3.2.1.



- When plugging and unplugging the USB connector, put an interval of at least 10 seconds between those actions since Windows may take several to 10 seconds to add or delete the USB device.
- Hot plugging/unplugging is allowed for USB devices. However, do not plug or unplug the USB connector when:
 - The computer is on standby (in suspend mode) or
 - The COM port is open with the USB-COM interface being used. (Hot plugging/unplugging under this condition will lose data.)
- When the host computer is processing the scanner connection, do not plug or unplug any other USB device cables.
- Directly connect the scanner to the USB port on the host computer or to the self-powered hub. The scanner may not be connected to some types of hubs. If the operation of the hub-connected scanner is unstable, connect it directly to any USB port on the host computer.
- Do not use any extension cord.

3.2.1 Setting up the USB-COM interface

Using the USB-COM interface requires installing the Active USB-COM port driver provided by DENSO WAVE to the host computer. The driver does not come with the scanner in a CD-ROM. It can be downloaded for free from our website at:

<http://www.qbdirect.net>

The file downloaded contains the Active USB-COM port driver and uninstaller which are compressed. It is a self-extracting file. Store the file into a folder and then double-click its icon to extract it. For the latest information, refer to the manual that comes with the driver.

Notes for installing and using the Active USB-COM port driver

- The driver should be installed with administrative permission (Administrator Login).
- The driver does not contain a Microsoft digital signature. Therefore, do not block installation of drivers containing no signature with the driver's signature option or local policy's security option.
- The driver allows hot plugging or unplugging of a USB device even during communication (when the COM port is being opened); however, the communications data when the USB device is disconnected will be lost.
- The driver always serves as a virtual serial port even if a USB device is unplugged, so the driver always occupies a COM port number.
- The driver cannot coexist with conventional Denso USB-COM device drivers in a host computer. In the installation procedure, the Active USB-COM port driver requires uninstalling the conventional ones.
- Installing the driver on a single host computer more than one time enables more than one USB device to be used. However, the uninstaller of the Active USB-COM port driver uninstalls previously installed drivers, not individually but all at once.

Installation procedure

Refer to the installation procedure for "Active USB-COM Port Driver Installation Guide."

3.2.2 Setting up the USB keyboard interface

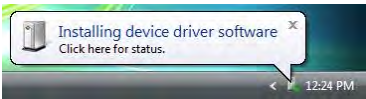
The USB keyboard interface requires the USB device class driver for HID (Human Interface Device) which is included in Windows 98 or later Operating Systems and whose setup wizard will automatically run. You do not need to install the device driver.

Note: If the USB-COM interface is set up, switch it to the USB keyboard interface by reading the “USB keyboard interface” Barcode symbol given in Section 11.2 with the parameter setting procedure in Section 11.1. (Plugging the USB interface cable in the scanner automatically switches to the USB keyboard interface by default.)

Connecting the USB interface cable to the host's USB port or USB hub automatically runs the system-supplied driver setup wizard. Follow the wizard and set up the driver. This section describes the procedure on each of Windows XP and Windows Vista. On Windows 7 also, follow the wizard.

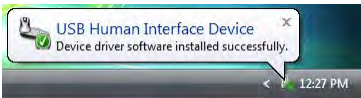
Windows 7 / Windows Vista

- (1) Switch the computer on to run Windows 7 or Windows Vista. Log on as an Administrator.
- (2) Connect the scanner's USB interface cable to the computer or USB hub.

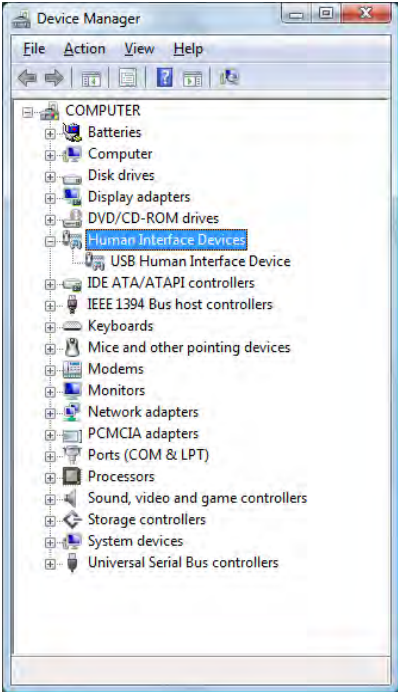


- (3) Wait for the Installing device driver software hint to pop up on the Windows task tray.

Windows will automatically configure the scanner. Upon completion of the configuration, the screen shown at left automatically disappears.



- (4) Wait for the USB Human Interface Device hint to pop up on the task tray.



- (5) To check whether the USB device is working normally, open the Windows Device Manager.

If USB Human Interface Device is added to the sub-tree of Human Interface Devices as shown at left, the scanner is connected normally.

If the device is not added or it is marked with  or , remove this driver with the uninstaller, reboot your computer, and perform the above connection process again.

Windows XP

- (1) Switch the computer on to run Windows XP. Log on as an Administrator.
- (2) Connect the scanner's USB interface cable to the computer or USB hub.



- (3) Wait for the Found New Hardware hint to pop up on the Windows task tray.

Windows will automatically configure the scanner. Upon completion of the configuration, the screen shown at left automatically disappears.



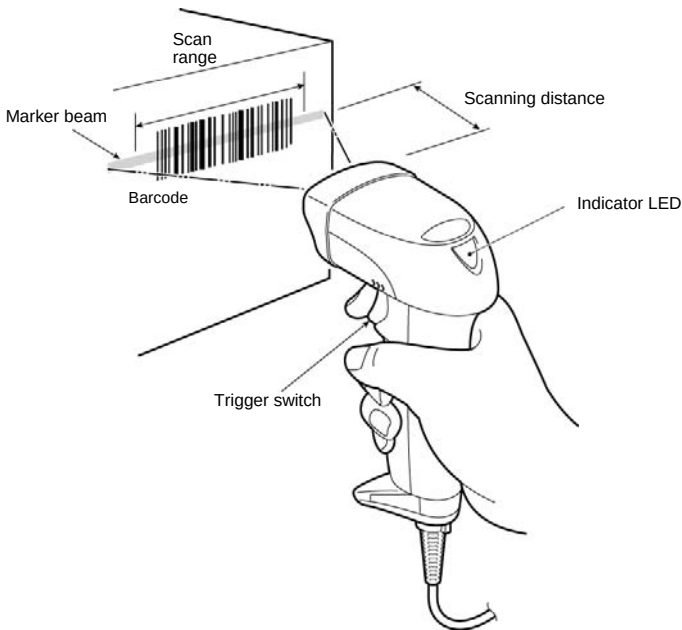
- (4) To check whether the USB device is working normally, open Windows Device Manager.

If USB Human Interface Device is added to the sub-tree of Human Interface Devices as shown at left, the scanner is connected normally.

If the device is not added or it is marked with  or , remove this driver with the uninstaller, reboot your computer, and perform the above connection process again.

Chapter 4 Reading Barcodes

- (1) Bring the reading window to a target barcode and press the trigger switch.
The marker beam comes on, indicating the scan range.
The illumination LEDs light and the scanner reads the target barcode.
(This operation is not required for the Continuous reading mode, Auto sensing mode and the Auto stand mode.)
- (2) Adjust the center mark of the marker beam to the center of the Barcode.
- (3) If the Barcode is read, the beeper sounds, and the LED indicator lights up in blue.



Precautions when reading

- The standard of the Reading distance is about 3.9 inches (10 cm).
- Make the Barcode label as flat as possible when it is distorted.
- The scanner may not read labels under direct sunshine or in extremely bright places.
- The scanner can read codes bi-directionally.
- Take out the labels when it covered with plastic films.
- To read the same Barcode again after it has been correctly read in the Continuous reading mode, move the scanner's reading window a sufficient distance away from the Barcode for approximately 1 second. Resume the reading after the LED indicator turns OFF.

■ Reading mode

Regular read mode	This mode transfers the code data when the scanner has read the barcode successfully.
Data verification mode	This mode verifies the barcode data against the master data stored in the scanner. (Refer to Section 7.1 for details.)

Chapter 5 Setting Parameters

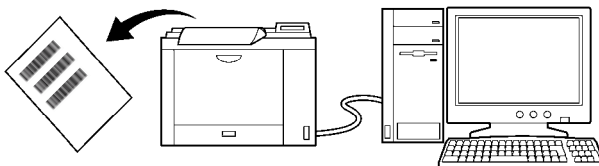
You can customize the scanner by modifying communications, code type, and other scanner parameters with the bar coded parameter menu or the configuration software ScannerSetting*. These parameters retain their settings even when the power is off.

- (1) Reading parameter setting barcodes from the Bar coded parameter menu by pressing the trigger switch.
(The Bar coded parameter menu is given in Chapter 11.)

- (2) Using the configuration software (Scanner Setting)* in your computer.

The configuration software is available via the RS-232C interface or USB-COM interface; it is not via the USB keyboard interface.

The configuration software also offers batch-process barcode symbols for read by scanners in the field. Those symbols printed can be scanned by the scanner via any of the RS-232C interface, USB-COM interface and USB keyboard interface.



Note: The configuration software cannot be used when the USB keyboard interface mode is selected for the scanner.

- * Registered users can download the configuration software (Scanner Setting) from QBdirect, their customer support section on the Denso Wave website at no extra charge.

For further details on QBdirect or to register, visit the following URL.

<http://www.qbdirect.net>

Chapter 6 Reading Control

Two types of reading controls are available--Trigger switch control and Software control.

Trigger switch control: Pressing the trigger switch readies the scanner for reading. (Refer to Section 6.1.)

Software control: Instead of pressing the trigger switch, you send control commands from the host computer via the RS-232C or USB-COM interface to ready the scanner for reading or put the scanner on standby. (Refer to Section 6.2.)

In addition, the auto sensing mode and auto stand mode is also available. (Refer to Sections 6.3.)

6.1 Trigger Switch Control

Pressing the trigger switch turns on the illumination LEDs and readies the scanner for reading. The scanner supports the following five trigger switch operating modes. Select the one that best meets your needs using the bar coded parameter menu or the configuration software (Scanner Setting).

(1) Auto-off mode

When the trigger switch is pressed, the scanner is brought to the Active state for approximately five seconds.

The scanner automatically returns to the Ready state when reading is successfully completed, or after approximately five seconds elapsed with the trigger switch pressed.

The scanner goes to the Ready state if the trigger switch is released before five seconds elapses.(in the case of normal mode)

When the Auto off mode is set to be active only once (one-shot mode), the time required for the scanner to become the Ready state after the trigger switch was pressed shall be designated in the setting.

(2) Momentary switching mode

The scanner is brought to the Active state only when the trigger switch is pressed, and returns to the Ready state when the trigger switch is released.

(3) Momentary switching mode (Inversion type)

The scanner is brought to the Ready state only when the trigger switch is pressed, and returns to the Active state when the trigger switch is released.

(4) Alternate switching mode

The scanner alternates between the Active state and the Ready state every time the trigger switch is pressed.

(5) Continuous reading mode 1

When you turn the scanner on, the scanner lights the illumination LEDs and becomes ready to scan. The scanner ignores all trigger switch input.

If the scanner receives the Z, READOFF or LOFF command, it switches to standby; if it receives the R, READON or LON command, it becomes ready to scan.

You can select whether or not the scanner transmits the ERROR command when the scanner cannot complete reading and switches to standby, using the configuration software (Scanner Setting).

(6) Continuous reading mode 2

This mode is functionally equivalent to the continuous reading mode 1, except that the scanner waits for a command upon completion of reading.

To become ready to scan, the scanner should receive the Z, READOFF or LOFF command to switch to standby and then receive the R, READON or LON command.

You can select whether or not the scanner transmits the ERROR command when the scanner cannot complete reading and switches to standby, using the configuration software (Scanner Setting).

Note: When you are setting parameters using the bar coded parameter menu, the scanner is always in the auto-off mode regardless of the trigger switch operating mode selected.
--

6.2 Software Control

You can control the scanner by sending reading control commands from the host computer via the RS-232C or USB-COM interface, instead of pressing the trigger switch.

Reading control commands include R, READON, LON, Z, READOFF and LOFF and are restricted by the trigger switch operating modes, as listed below.

(√ : Command valid)

Commands	Description	Trigger switch operating modes				
		Auto-off mode	Momentary switching mode	Momentary switching mode (Reverse type)	Alternate switching mode	Continuous reading mode 1 or 2
R, READON, LON	<u>Ready-to-scan commands</u> Upon receipt of one of these commands, the scanner lights the illumination LEDs and becomes ready to scan.	×	×	×	×	√
Z, READOFF, LOFF	<u>Standby commands</u> Upon receipt of one of these commands, the scanner turns off the illumination LEDs and switches to standby.	×	×	×	×	√

Each of these commands should be enclosed with a header and terminator for transmission according to the communications conditions of the scanner.

6.3 Reading by Automatic detection of labels

In auto sensing mode (Auto sense operation in auto stand mode is included), bringing a barcode label within the scan range of the reading window turns on the illumination LEDs and starts the scanner reading the barcode. No trigger switch operation is required. Use this mode when the scanner is stationary to a stand and a barcode label is moved.

The illumination LEDs come on when you bring a barcode label within the designated range or move a barcode label within the same range. These LEDs go off when a barcode label is moved away from the range or stays within the range without move for approx. 5 seconds.

The scanner is set to the Auto sense operation when the power is turned on.

If the trigger switch is pressed while the scanner is operating in this mode, the scanner goes to the Auto off and reads a barcode whenever the trigger switch is pressed.

However, the scanner will automatically return to the Auto sense operation if the trigger switch is not pressed for longer than a time specified for the scanner to return to the Auto sense.

The time for the scanner to return to the Auto sense operation from the Auto off operation can be selected with the configuration software.

Auto sensing mode and Auto stand mode are selected with the bar coded parameter menu or the configuration software (Scanner Setting).

The scanner offers a choice of three sensitivity levels for responding to barcodes. Switch to a higher sensitivity level if the illumination LEDs will not come on when a barcode is brought into the range, for example.

Note: Even if you do not bring a barcode label within the scan range, the illumination LEDs may come on when the ambient level of light changes or any shadows move within the scan range.

Note: To enable the scanner to work properly in auto sensing mode, an ambient illuminance of at least 500 lx is required.

Chapter 7 Reading Functions

7.1 Data Verification Mode

The data verification mode verifies the barcode data read against the master data stored in the scanner and reports the match status with data output.

Data verification read is available in two types--"n-point verification" and "2-point verification," which can be selected with the configuration software (Scanner Setting).

Selecting the n-point verification requires registering master data only one time for 1:n verification. The scanner verifies all barcode data read after registration against the master data.

The 2-point verification refers to 1:1 verification. Selecting it requires registering master data each time preceding barcode reading. After registration of master data, the scanner reads a barcode, verifies the barcode data read against the master data and then becomes ready to register new master data. This way, the 2-point verification read alternately repeats master data registration and barcode reading.

In n-point verification read, master data can be registered with "preset master registration" or "scan master registration"; in 2-point verification read, with "scan master registration" only. The preset master registration registers master data with the configuration software (Scanner Setting) beforehand, and the scan master registration, by reading a master barcode label.

The master data registered by "preset master registration" or "scan master registration" will be sent to the host computer when you scan the "Output master data" code given on page 17.

The verification parameters can be specified with the configuration software (Scanner Setting).

7.1.1 Data verification read procedure

■ n-point verification

Preset master registration

This is available only when n-point verification is selected. Register the code type and data to be used for verification using the configuration software (Scanner Setting). Up to 99 digits can be registered.

The registered master data will be preserved even if the scanner is turned off. To clear it, first clear the registered master data stored in the host computer with the configuration software (Scanner Setting) and then send the new setting data to the scanner.

Scan master registration

- 1) Switch the scanner to the data verification mode and select the RS-232C or USB-COM interface.
- 2) Send a scan entry control command "E" from the host to the scanner.
(Refer to Appendix 2 for control commands.) The indicator LED lights in green.
- 3) Use the scanner to scan a master code to be registered.
(The scanner operates in the trigger switch operating mode currently set.)
After registration of master data, the indicator LED turns blue and then goes OFF.
- 4) Use the scanner to scan a target barcode. The scanner verifies the code read against the master data registered and then outputs the result. After a successful read, the indicator LED lights in blue.

During the registration operation above, if the master data has fewer characters than specified (e.g., less than the specified verification start position), the registration operation aborts with an error.

Even if "Preset master registration" has been made, you can make "Scan master registration." If both have been made, the number of characters to verify that has been specified with "Preset master registration" and the master data that has been specified with "Scan master registration" will be valid.

- Note:** The registered master data will be cleared when you customize the scanner by modifying the parameters with the configuration software (Scanner Setting) or a batch-process barcode symbol.
- Note:** If no master data has been entered by either "Preset master registration" or "Scan master registration," the indicator LED flashes in red, during which it is impossible to scan codes.
- Note:** When the USB keyboard interface is used in the n-point Verification mode, the n-point Verification is disabled and the normal reading mode is automatically selected if preset registered data is not present.

■ 2-point verification

Scan master registration

- 1) Switch the scanner to the data verification mode and select the RS-232C or USB-COM interface.
The indicator LED lights in green.
- 2) Use the scanner to scan a master code to be registered. (The scanner operates in the trigger switch operating mode currently set.)
After the registration of master data, the indicator LED turns blue and then goes OFF.
- 3) Use the scanner to scan a target barcode. The scanner verifies the barcode read against the master data registered and then outputs the result.
After a successful read, the indicator LED lights in blue and then turns green, indicating that the scanner is ready to register *new* master data.

During the registration procedure above, if the master data has fewer characters than specified (e.g., less than the specified verification start position), the registration operation aborts with an error. The scanner becomes ready to register master data again.

Verification retry after mismatch in 2-point verification

The 2-point verification read provides the "Verification retry after mismatch" option that retries verification against the same master data. Enabling this option with the configuration software (Scanner Setting) readies the scanner not for registering new master data but for reading a barcode again if the verification result is a mismatch.

Disabling this option readies the scanner for registering new master data after barcode reading, no matter what the verification result is.

Note: Any of the following events clears the master data stored in the scanner.

- Turning the scanner power off.
- Modifying the verification start position or the number of characters to verify.
- Customizing the scanner by modifying the parameters with the configuration software (ScannerSetting) or by reading a batch-process Barcode symbol.

Note: The data verification area can be selected from "Code type + code data" or "Code data only" with the configuration software (Scanner Setting).

7.1.2 Specifying a verification object

You can specify two types of verification objects--data string and data block. For data string verification, specify the verification start position and the number of characters to be verified. For data block verification, specify one of the data blocks delimited by commas in the CSV format.

(1) Data string verification

The scanner verifies data specified by the verification start position and the number of characters to be verified against the master data registered in the scanner, and then it outputs the verification result.

The verification start position should be within the range of 1 to 999, and the number of characters* to be verified, within the range of 1 to 99.

*The number of characters for CODE39 symbols should be specified including start and stop codes.

In any of the following cases, the verification results in a mismatch:

- 1) The verification data in the specified position does not match the master data.
- 2) The code type which the verification data belongs to is different from the one which the master data belongs to. See (Note) below.
- 3) All data specified is not included or no data is included within the specified range.

(Examples)

Master data registered	Verification start position	No. of characters to be verified	Data string read (Verification object)	Result
345	3	3	00 345	Match
345	3	3	00 345 678	Match
345	3	3	00 346	Mismatch
345	3	3	00 34	Mismatch

(2) Data block verification

If data is saved in the comma-delimited CSV format, the scanner verifies data in the specified data block against the master data registered in the scanner, and then outputs the verification result.

The data block position should be within the range of 1 to 99.

In any of the following cases, the verification results in a mismatch:

- 1) The verification data in the specified block does not match the master data.
- 2) The code type which the verification data belongs to is different from the one which the master data belongs to. See (Note) below.
- 3) All data specified is not included or no data is included within the specified block.
- 4) The data block to be verified exceeds 99 characters in length.

(Examples)

Master data registered	Position of data block to be verified	Data string read (Verification object)	Result
345	3	0,12, 345 ,6789	Match
345	3	0,12, 346 ,6789	Mismatch
345	3	0,12, 3456 ,6789	Mismatch
345	3	0,12, 34 ,6789	Mismatch
345	3	0,12	Mismatch

(Note) Whether the code ID mark is matched or not is determined not by the combination of code ID marks Type1 and Type2 but by Type1 only (refer to Chapter 9, Section 9.4).

7.1.3 Verification result output

(1) Report of match / mismatch status

You can select any of the following report types using the configuration software (ScannerSetting).
Selecting "Disable transmission" reports nothing.

Setting	If there is a match:	If there is a mismatch:
1	Disable transmission.	Disable transmission.
2	Enable code data transmission.	Enable code data transmission.
3	Enable OK transmission.	Enable NG transmission.

(2) Beeper and indicator LED

You can check whether the verification result is a match or mismatch with the beeper and indicator LED.
When the beeper and indicator LED are enabled, they act as shown below.

	Beeper	Indicator LED
If there is a match:	Emits a short beep.	Lights in blue.
If there is a mismatch:	Emits a long beep.	Lights in red.

Output of the master data registered

Reading the "Output master data" barcode given below lets the scanner output the verification section of master data entered in the data verification read procedure, together with the code ID mark.



"Output master data" barcode

7.2 Data Editing

You can edit and output code data read, in any of the three data edit modes--“data extraction mode,” “data conversion mode” and “blocksorting mode.” These data edit modes can be selected with the configuration software (Scanner Setting). The default is “No editing.”

7.2.1 Data extraction mode

This mode offers three extraction choices--“data string,” “data block” and “AI (Application Identifier)-prefixed string” extractions from code data read and then outputs it.

The “data block” extraction is available only when code data is in the comma-delimited CSV format.
The “AI-prefixed string” extraction is available for GS1-128 (EAN-128) and GS1 DataBar (RSS) symbols.

7.2.1.1 Extracting a data string

The scanner extracts a data string specified by the “Extraction start position” and “Extraction end position” from a code specified by the “Code type” and then outputs it in the data transmission format selected in the scanner (see Chapter 9, Section 9.4). The extraction conditions and extraction start and end positions are listed below.

■ Extraction conditions

Extraction conditions	Setting data
“Code type”	Any code
	UPC-A/EAN-13
	UPC-E
	EAN-8
	CODE128
	GS1-128 (EAN-128)
	CODABAR (NW-7)
	CODE39
	Interleaved 2 of 5(ITF)
	Standard 2 of 5(STF)
	CODE32
	CODE93
	MSI
	Plessey
	GS1 DataBar (RSS)
“Transmit data regardless of the results”	Permit / Prohibit

If the scanner fails to extract a data string or scans a code not specified by “Code type” when the “Transmit data regardless of the results” is permitted, then it outputs the data read as is without editing.

■ Extraction start and end positions

"Extraction start position"	"Extraction end position"
Head position	<i>n</i> th position
Tail position	
<i>n</i> th position	Tail position
	By <i>n</i> positions from the start position
	<i>n</i> th position

The *n* can be 1 through 9999. Note that if the extraction start position is specified as *n*th position, the extraction end position should be equal to or greater than the extraction start position.

Note: The number of characters for CODE39 and CODABAR (NW-7) symbols should be specified including start and stop codes.

Example Code type : CODE128, Data : 12345,
Header : STX, Terminator : ETX, Scanner ID : Disable, Code ID mark : Type 1,
Transmission of the number of digits : 2-digits, Prefix / Suffix : None, BCC : Disable

Extraction conditions	Extraction start position	Extraction end position	Output data
"Code type": CODE128 "Transmit data regardless of the results": Prohibit	Head position	3rd position	[STX]K03123[ETX]
	Tail position	3rd position	[STX]K03345[ETX]
	1st position	Tail position	[STX]K0512345[ETX]
	1st position	By 3 positions	[STX]K03123[ETX]
	2nd position	4th position	[STX]K03234[ETX]
	Head position	6th position	Error
	Tail position	6th position	Error
	6th position	Tail position	Error
	6th position	By 10 positions	Error
	1st position	6th position	Error
"Code type": CODE128 "Transmit data regardless of the results": Permit	Head position	6th position	[STX]K0512345[ETX]
	Tail position	6th position	[STX]K0512345[ETX]
	6th position	Tail position	[STX]K0512345[ETX]
	6th position	By 10 position	[STX]K0512345[ETX]
	1st position	6th position	[STX]K0512345[ETX]
"Code type": EAN-8 "Transmit data regardless of the results": Prohibit	Invalid if specified.	Invalid if specified.	Error
"Code type": EAN-8 "Transmit regardless of the results": Permit	Invalid if specified.	Invalid if specified.	[STX]K0512345[ETX]

7.2.1.2 Extracting data blocks

If data read is in the comma-delimited CSV format, the scanner extracts data blocks specified by the data block numbers from a code specified by the "Code type" and then outputs it in the data transmission format selected in the scanner (see Chapter 9, Section 9.4). The extraction conditions and data bock numbers are listed below.

■ Extraction conditions

Extraction conditions	Setting data
"Code type"	Any code
	UPC-A/EAN-13
	UPC-E
	EAN-8
	CODE128
	GS1-128 (EAN-128)
	CODABAR (NW-7)
	CODE39
	Interleaved 2 of 5(ITF)
	Standard 2 of 5(STF)
	CODE32
	CODE93
	MSI
	Plessey
"Transmit data regardless of the results"	GS1 DataBar (RSS)
	Permit / Prohibit

If the scanner fails to extract a data block or scans a code not specified by "Code type" when the "Transmit data regardless of the results" is permitted, then it outputs the data read as is without editing.

■ Data block numbers

Each data block number should be within the range from 1 through 99. Up to three blocks can be extracted.

Example Code type : CODE128, Data : (See the table below.)
Header : STX, Terminator : ETX, Scanner ID : Disable, Code ID mark : Disable,
Transmission of the number of digits : Disable, Prefix / Suffix : None, BCC : Disable

Extraction conditions	Data read	Data block numbers	Output data
"Code type": CODE128 "Transmit data regardless of the results": Prohibit	1,23,456,7890	1, 2 and 3	[STX]1[ETX][STX]23[ETX][STX]456[ETX]
	1,23,456,7890	3, 1 and 2	[STX]456[ETX][STX]1[ETX][STX]23[ETX]
	1234567890	1	[STX]1234567890[ETX]
	1,,23,456,7890	2 and 5	[STX][ETX][STX]7890[ETX]
	1,23,456,7890	5	Error
	1,23,456,7890	4 and 5	Error
	1234567890	1 and 2	Error
"Code type":CODE128 "Transmit data regardless of the results": Permit	1,23,456,7890	5	[STX]1,23,456,7890[ETX]
	1,23,456,7890	4 and 5	[STX]1,23,456,7890[ETX]
	1234567890	1 and 2	[STX]1234567890[ETX]
"Code type" : EAN-8 "Transmit data regardless of the results": Prohibit	1,23,456,7890	Invalid if specified.	Error
"Code type" : EAN-8 "Transmit data regardless of the results": Permit	1,23,456,7890	Invalid if specified.	[STX]1,23,456,7890[ETX]

7.2.1.3 Extracting AI (Application Identifier)-prefixed strings

If the scanner reads any of GS1-128 (EAN-128) and GS1DataBar (RSS) symbols, it edits the data according to AI and outputs it in the data transmission format selected in the scanner (see Chapter 9, Section 9.4).

The "AI-prefixed string" extraction is available in two modes--AI-delimited mode and AI parenthesizing mode. AI to be used for data editing are listed in [\(3\) AI table](#) later.

(1) AI-delimited mode

In this mode, the scanner extracts strings prefixed with AI specified (up to three types of AI) and separates them with the specified delimiters (selectable from headers / terminators, commas and tabs) instead of AI to output them.

■ Extraction conditions

Extraction conditions	Setting data
"Transmit data regardless of the results"	Permit/Prohibit

If the scanner fails to extract an AI-prefixed string when the "Transmit data regardless of the results" is permitted, it outputs the data read as is without editing.

■ Delimiters

● Header / terminator

Specifying a header/terminator as delimiters prefixes a header and suffixes a terminator to each element string separated.

A scanner ID, code ID mark, the number of digits, prefix, and suffix can be also added to each element string if their transmissions are enabled.

The number of digits is the count of each element string edited.

Example Data read : (01)94901234567894(11)030808(13)030810
Header : STX, Terminator : ETX, Scanner ID : Disable, Code ID mark : Disable,
Transmission of the number of digits : 2 digits, Prefix / Suffix : None, BCC : Disable

AI specified	Output data
01,11,13	[STX]1494901234567894[ETX][STX]06030808[ETX][STX]06030810[ETX]

● Comma

Specifying a comma as delimiters outputs comma-delimited data. No comma follows the tail of the data.

A header and terminator are added to the full string. None of a scanner ID, code ID mark, the number of digits, prefix, and suffix is added even if their transmissions are enabled.

Example Data read : (01)94901234567894(11)030808(13)030810
Header : STX, Terminator : ETX, Scanner ID : Disable, Code ID mark : Disable,
Transmission of the number of digits : Disable, Prefix/Suffix : None, BCC : Disable

AI specified	Output data
01,11,13	[STX]94901234567894,030808,030810[ETX]

● Tab (ASCII 09H (HT))

Specifying a tab as delimiters outputs tab-delimited data. No tab follows the tail of the data.

A header and terminator are added to the full string. None of a scanner ID, code ID mark, the number of digits, prefix, and suffix is added even if their transmissions are enabled.

Example Data read : (01)94901234567894(11)030808(13)030810
Header : STX, Terminator : ETX, Scanner ID : Disable, Code ID mark : Disable,
Transmission of the number of digits : Disable, Prefix/Suffix : None, BCC : Disable

AI specified	Output data
01,11,13	[STX]94901234567894[TAB]030808[TAB]030810[ETX]

Example Data read : (01)94901234567894(11)030808(13)030810(17)040208(17)040305
Header : STX, Terminator : ETX, Scanner ID : Disable, Code ID mark : Disable,
Transmission of the number of digits : Disable, Prefix/Suffix : None, BCC : Disable

Extraction conditions	AI specified	Delimiter	Output data
"Transmit data regardless of the results": Prohibit	01,11,17	Comma	[STX]94901234567894,030808,040208[ETX]
	17,11		[STX]040208,030808[ETX]
	17,17		[STX]040208,040305[ETX]
	12		Error
	01,12		Error
	01,01		Error
"Transmit data regardless of the results": Permit	01,11,17		[STX]94901234567894,030808,040208[ETX]
	17,11		[STX]040208,030808[ETX]
	17,17		[STX]040208,040305[ETX]
	12		[STX]019490123456789411030808130308101704020817040305[ETX]
	01,12		
	01,01		

(Note 1) Element strings will be output in the order of AI specified.

(Note 2) If data read contains two or more element strings prefixed with the same AI, those element strings will be output in the order arranged in that data read.

(Note 3) If data read does not contain a string prefixed with the specified AI or it contains such data but its number of digits is more or less than the one defined for that AI, an error will result when the "Transmit data regardless of the results" is prohibited.

(2) AI parenthesizing mode

In this mode, the scanner parenthesizes AI contained in data read and outputs the edited data according to the extraction conditions.

■ Extraction conditions

Extraction conditions	Setting data
"Transmit data regardless of the results"	Permit/Prohibit

If the scanner fails to extract an AI-prefixed element string when the "Transmit data regardless of the results" is permitted, it outputs the data read as is without editing.

Example Header : STX, Terminator : ETX, Scanner ID : Disable, Code ID mark : Disable,
Transmission of the number of digits : Disable, Prefix/Suffix : None, BCC : Disable

Extraction conditions	Data read	Output data
"Transmit data regardless of the results": Prohibit	0194901234567894110308081303081017040208	[STX](01)94901234567894(11)030808(13)030810(17)040208[ETX]
	0194901234567894110308081303081061704020817040305	Error (Note1)
"Transmit data regardless of the results": Permit	0194901234567894110308081303081017040208	[STX](01)94901234567894(11)030808(13)030810(17)040208[ETX]
	0194901234567894110308081303081061704020817040305	[STX]0194901234567894110308081303081061704020817040305[ETX]

(Note 1) Data from the head to element string 030810 prefixed with AI (13) can be normally extracted, but the following data (as underlined below) causes an error since it starts with 6 that cannot start any AI.

(01)94901234567894(11)030808(13)03081061704020817040305

(3) AI table

In the AI-prefixed string extraction, the scanner edits data according to the Application Identifiers (AI) defined below.

AI	Format	Description
00	n2+n18	Serial Shipping Container Code (SSCC)
01	n2+n14	Global Trade Item Number (GTIN)
02	n2+n14	GTIN of Trade Items Contained in a logistic unit (For Use with AI 37 Only)
03	n2+n14	Reserved.
04	n2+n16	Reserved.
10	n2+an..20	Batch or Lot Number
11	n2+n6	Production Date (YYMMDD) (*)
12	n2+n6	Due Date (YYMMDD) (*)
13	n2+n6	Packaging Date (YYMMDD) (*)
15	n2+n6	Best Before Date (YYMMDD) (*)
17	n2+n6	Expiration Date (YYMMDD) (*)
20	n2+n2	Product Variant
21	n2+an..20	Serial Number
22	n2+an..29	HIBCC (Health Industry Business Communication Council)--Quantity, Date, Batch, and Link
23n	n3+n..19	Batch or Lot Number (Transitional Use) (**)
240	n3+an..30	Additional Product Identification Assigned by the Manufacturer
241	n3+an..30	Customer Part Number
250	n3+an..30	Secondary Serial Number
251	n3+an...30	Reference to Source Entity
252	n3+n27	Global Serial Number
30	n2+n..8	Quantity
310n	n4+n6	Net Weight, Kilograms
311n	n4+n6	Length or 1st Dimension, Meters
312n	n4+n6	Width, Diameter, or 2nd Dimension, Meters
313n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Meters
314n	n4+n6	Area, Square Meters (***)
315n	n4+n6	Volume, Liters (***)
316n	n4+n6	Volume, Cubic Meters (***)

AI	Format	Description
320n	n4+n6	Net Weight, Pounds (***)
321n	n4+n6	Length or 1st Dimension, Feet (***)
322n	n4+n6	Length or 1st Dimension, Yards (***)
323n	n4+n6	Width, Diameter, or 2nd Dimension, Inches (***)
324n	n4+n6	Width, Diameter, or 2nd Dimension, Feet (***)
325n	n4+n6	Width, Diameter, or 2nd Dimension, Yards (***)
326n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Inches (***)
327n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Feet (***)
328n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Yards (***)
329n	n4+n6	Gross Weight, Kilograms (***)
330n	n4+n6	Length or 1st Dimension, Meters, Logistics (***)
331n	n4+n6	Width, Diameter, or 2nd Dimension, Meters, Logistics (***)
332n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Meters, Logistics (***)
333n	n4+n6	Area, Square Meters, Symbology (***)
334n	n4+n6	Gross Volume, Liters (***)
335n	n4+n6	Gross Volume, Cubic Meters (***)
336n	n4+n6	Kilograms per Square Meter (pressure) (***)
337n	n4+n6	Gross Weight, Pounds (***)
340n	n4+n6	Length or 1st Dimension, Feet (***)
341n	n4+n6	Length or 1st Dimension, Inches, Logistics (***)
342n	n4+n6	Length or 1st Dimension, Feet, Logistics (***)
343n	n4+n6	Length or 1st Dimension, Yards, Logistics (***)
344n	n4+n6	Width, Diameter, or 2nd Dimension, Inches, Logistics (***)
345n	n4+n6	Width, Diameter, or 2nd Dimension, Feet, Logistics (***)
346n	n4+n6	Width, Diameter, or 2nd Dimension, Yards, Logistics (***)
347n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Inches, Logistics (***)
348n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Feet, Logistics (***)
349n	n4+n6	Depth, Thickness, Height, or 3rd Dimension, Yards, Logistics (***)
350n	n4+n6	Area, Square Inches (***)
351n	n4+n6	Area, Square Feet (***)
352n	n4+n6	Area, Square Yards (***)

AI	Format	Description
353n	n4+n6	Area, Square Inches, Logistics (***)
354n	n4+n6	Area, Square Feet, Logistics (***)
355n	n4+n6	Area, Square Yards, Logistics (***)
356n	n4+n6	Net Weight, Troy Ounces (***)
357n	n4+n6	Net Volume, Ounces (***)
360n	n4+n6	Volume, Quarts (***)
361n	n4+n6	Volume, Gallons (***)
362n	n4+n6	Gross Volume, Quarts (***)
363n	n4+n6	Gross Volume, Gallons (***)
364n	n4+n6	Volume, Cubic Inches (***)
365n	n4+n6	Volume, Cubic Feet (***)
366n	n4+n6	Volume, Cubic Yards (***)
367n	n4+n6	Gross Volume, Cubic Inches (***)
368n	n4+n6	Gross Volume, Cubic Feet (***)
369n	n4+n6	Gross Volume, Cubic Yards (***)
37	n2+n..8	Quantity (For Use with AI 02 Only)
390n	n4+n15	Amount Payable--Single Monetary Area
391n	n4+n3+n15	Amount Payable and ISO Currency Code
392n	n4+n15	Amount Payable for a Variable Measure Trade Item--Single Monetary Area
393n	n4+n3+n15	Amount Payable for a Variable Measure Trade Item and ISO Currency Code
400	n3+an..30	Customer's Purchase Order Number
401	n3+an..30	Consignment Number
402	n3+n17	Shipment Identification Number
403	n3+an..30	Routing Code
410	n3+n13	Ship to (Deliver to) EAN.UCC Global Location Number
411	n3+n13	Bill to (Invoice to) EAN.UCC Global Location Number
412	n3+n13	Purchased from EAN.UCC Global Location Number
413	n3+n13	Ship for (Deliver for) EAN.UCC Global Location Number
414	n3+n13	Identification of a Physical Location--EAN.UCC Global Location Number
415	n3+n13	EAN.UCC Global Location Number of the Invoicing Party
420	n3+an..20	Ship to (Deliver to) Postal Code Within a Single Postal Authority

AI	Format	Description
421	n3+n3+an..9	Ship to (Deliver to) Postal Code with Three-Digit ISO Country Code Prefix
422	n3+n3	Country of Origin of a Trade Item
423	n3+n15	Country of Initial Processing
424	n3+n3	Country of Processing
425	n3+n3	Country of Disassembly
426	n3+n3	Country of Final Processing
43	n2+n4+n7+an ..10+n1	Carrier Assigned Tracking Number
7001	n4+n13	NATO Stock Number (NSN)
7002	n4+an..30	UN/ECE Meat Carcasses and Cuts Classification
7003	n4+n10	Effective term (YYMMDDHHMM)
7030	n4+n3+an..27	Approval Number of Processor with Three-Digit ISO Country Code, Butchery
7031	n4+n3+an..27	Approval Number of Processor with Three-Digit ISO Country Code, 1st Processing Place
703n	n4+n3+an..27	Approval Number of Processor with Three-Digit ISO Country Code, 2nd to 9th Processing Places
8001	n4+n14	Roll Products--Width, Length, Core Diameter, Direction, and Splices
8002	n4+an..20	Cellular Mobile Telephone Identifier
8003	4+n14+an..16	EAN.UCC Global Returnable Asset Identifier (GRAI)
8004	n4+an..30	EAN.UCC Global Individual Asset Identifier (GIAI)
8005	n4+n6	Price Per Unit of Measure
8006	n4+n14+n2+n 2	Identification of the Component of a Trade Item
8007	n4+an30	International Bank Account Number (IBAN)
8008	n4+n6+n6	Date and Time of Production (YYMMDDHHMMSS)
8018	n4+n18	EAN.UCC Global Service Relation Number (GSRN)
8020	n4+an25	Payment Slip Reference Number
8100	n4+n1+n5	UPC Coupon Extended Code--Number System Character and Offer Code
8101	n4+n1+n5+n4	UPC Coupon Extended Code--Number System Character, Offer Code, and End of Offer Code
8102	n4+n1+n1	UPC Coupon Extended Code--Number System Character Preceded by Zero
90	n2+an..30	FACT Data Identifiers

AI	Format	Description
91	n2+an..30	Company Internal Information--Company
92	n2+an..30	Company Internal Information--Company
93	n2+an..30	Company Internal Information--Company
94	n2+an..30	Company Internal Information--Company
95	n2+an..30	Company Internal Information--Carrier
96	n2+an..30	Company Internal Information--Carrier
97	n2+an..30	Company Internal Information--Company
98	n2+an..30	Company Internal Information--Company
99	n2+an..30	Company Internal Information

(*) To indicate only year and month, DD must be filled with "00".

(**) n indicates the length of data.

(***) n indicates the decimal point position.

a	Alphabetic characters
a3	3 alphabetic characters, fixed length
a..3	Up to 3 alphabetic characters
n	Numeric characters
n3	3 numeric characters, fixed length
n..3	Up to 3 numeric characters
an	Alphanumeric characters
an3	3 alphanumeric characters, fixed length
an..3	Up to 3 alphanumeric characters

Note : The scan data is transmitted up to GS(1Dh) when the specified AI length is variable and the number of scan data digits is less than maximum digits of AI.

Note : The AI definition is continuously updated by GS1.

Thus the AI definition may not comply with the standard depending on the updating timing.

7.2.2 Data conversion mode

If the scanner reads a barcode specified by the “Code type” in this mode, it searches the data read for the specified string (max. 16 ASCII characters), substitutes it with the specified conversion string (max. 16 ASCII characters), and outputs it in the data transmission format selected in the scanner (see Chapter 9, Section 9.4).

■ Conversion conditions

Conversion conditions	Setting data
“Code type”	Any code
	UPC-A/EAN-13
	UPC-E
	EAN-8
	CODE128
	GS1-128 (EAN-128)
	CODABAR (NW-7)
	CODE39
	Interleaved 2 of 5(ITF)
	Standard 2 of 5(STF)
	CODE32
	CODE93
	MSI
	Plessey
	GS1 DataBar (RSS)
Search string and conversion string	Max.16 ASCII characters (00h to FFh) each

Example Code type : CODE128, Data : 12345678
Header : STX, Terminator : ETX, Scanner ID : Disable, Code ID mark : Disable,
Transmission of the number of digits : Disable, Prefix / Suffix : None, BCC : Disable

Conversion condition	Search string and Conversion string	Output data
“Code type” : CODE128	2 → A 4 → B	[STX]1A3B5678[ETX]

7.2.3 Block sorting mode

The scanner splits barcode data read into a maximum of 5 blocks at the specified separate positions, sorts those blocks in the specified order, and outputs it in the data transmission format selected in the scanner (see Chapter 9, Section 9.4).

Note: The separate position must be specified by the number of digits from the head of barcode data read. Specifying the number of digits exceeding that in the barcode data results in an error.

■ Block sorting conditions

Block sorting conditions	Setting data
"Code type"	Any code
	UPC-A/EAN-13
	UPC-E
	EAN-8
	CODE128
	GS1-128 (EAN-128)
	CODABAR (NW-7)
	CODE39
	Interleaved 2 of 5(ITF)
	Standard 2 of 5(STF)
	CODE32
	CODE93
	MSI
	Plessey
	GS1 DataBar (RSS)
"Transmit data regardless of the results"	Permit / Prohibit

Example Code type : CODE128, Data : 1234567890
Header : STX, Terminator : ETX, Scanner ID : Disable, Code ID mark : Disable,
Transmission of the number of digits : 4 digits, Prefix / Suffix : None, BCC : Disable

Separate position	Oder of blocks	Output data
3rd position, 8th position	Block2, 1, 3	[STX]K00104567812390[ETX]
3rd position, 8th position	Block1, 3	[STX]K000512390[ETX]

Chapter 8 Beeper, Indicator LED

8.1 Beeper

(1) Beeping

The scanner emits a short or long beeps, once or a couple of times as described below.
(Refer to Section 8.3 for details of beeper in various states)

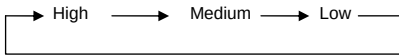
You can disable the beeper using the Bar coded parameter menu or configuration software (ScannerSetting).
In any of the following cases, however, the beeper sounds regardless of that beeper setting:

- when you make settings by reading the Bar coded parameter menu,
- when the scanner receives a beeper-ON command from the host computer,
- when the configuration software (Scanner Setting) starts up or any setting you have made is established,
- when the scanner reads a batch-process QR Code symbol,
- when the parameter values are saved by a PW command (refer to Appendix 2), and
- when the beeper is enabled at power ON.

(2) Adjusting the beeper volume

You can adjust the beeper volume to three levels--high, medium and low--using the Bar coded parameter menu or configuration software (Scanner Setting). The factory default is High.

Each time the “Beeper volume” Barcode symbol is read, the beeper volume cycles as shown below.



Even if the scanner is turned off, this setting will be retained.

At the shipment, the beeper volume is set at “High”.

(3) Adjusting the beeper frequency (tone)

The following three choices are available for beeper frequency (tone) using the barcode menu or configuration software (Scanner Setting).

Item	Frequency
Low	2.8 kHz
Medium	3.0 kHz
High	4.0 kHz

Even if the scanner is turned off, this setting will be retained.

At the shipment, the beeper frequency is set at “Medium.”

8.2 Indicator LED

The indicator LED lights or flashes in blue, green or red with scanner status.

(Refer to Section 8.3 for details of indicator LED in various states)

The indicator LED can be disabled with the Bar coded parameter menu or configuration software (Scanner Setting).

In any of the following cases, however, the indicator LED comes on regardless of the current LED setting.

- When the scanner is being customized with the Bar coded parameter menu (Chapter 11),
- When the scanner receives an LED-ON command (LB, LG or LR) from the host computer (refer to Appendix 2),
- When the configuration software (Scanner Setting) starts up or any setting is newly established,
- When the scanner reads a batch-process Barcode symbol,
- When the parameter values are saved by a PW command (refer to Appendix 2),
- When the scanner is in the scanner entry mode (refer to control command "E" in Appendix 2),
- When a master code is being registered or the registration is completed,
- When any error has occurred during registration of a master code,
- When the scanner has failed to save parameter values specified with the configuration software (Scanner Setting), Bar coded parameter menu, or control commands,
- When the trigger switch is pressed when the trigger switch control is disabled,
- An error occurred in the hardware.

8.3 Beeping, Indicator LEDs with scanner status

■ Normal operation

Status	Beeping	Indication LED
A read of a bar code is successfully complete	1 short beep (Note 1) (Note 2)	Lights in blue
Barcode data read matches the master data in the n-point verification scan mode	1 short beep (Note 1) (Note 2)	
Barcode data read matches the master data in the 2-point verification scan mode	2 short beeps	
Master data registration is successfully complete in the data verification mode	1 short beep (Note 1)	
The scanner is ready to register master data in the data verification mode	—	Lights in green (always)
The "Start setting", "End setting" or "Cancel" bar code is read from the bar code menu	3 short beeps	Flashes blue
Reading of parameter setting codes	1 short beep (Note 1)	Lights in blue
Configuration software starts up or accepts new setting	3 short beeps × 2	Flashes blue
The scanner has read the "STRT" or "END" bar code out of batch-process bar code symbols generated with the configuration software.	3 short beeps	
The scanner has read the "DATA1–8" barcode out of batch-process barcode symbols generated with the configuration software.	1 short beep (Note 1)	Lights in blue
Power activation (Note 3)	4 short beeps	—

(Note1) The configuration software provides three choices for the beeping time of a short beep-60, 80 and120 ms.

(Note2) Beeps 70 ms× 2 times (140ms) when setting of the sound to complete reading is compound sound.

(Note3) Beeps if configuration software accept beeping for when the power is on. (Default not allowed) power activation.

■ Error operation

Status	Beeping	Indication LED
Barcode data read does not match the master data in the data verification mode.	A long beep (480ms)	Flashes red
Any codes apart from parameter setting code is read from the barcode menu.		
Three minutes have elapsed without reading any parameter setting barcode after the barcode menu in the parameter setting procedudre.		
Three minutes have elapsed without reading DATA after the scanner has read the "START" barcode out of batch-process barcode symbols generated with the configuration software.		
A transmission error or timeout has occurred during communicaiton with the configuration software.		
Invalid control command is received.		
A master barcode has the wrong numbr of digits during registration of master data.		
ACK response monitoring time (1 sec) have elapsed in ACK/NAK mode.		
Trigger switch is pressed when trigger switch control is invalid.	—	

Status	Beeping	Indication LED
No master data has been registered in the n-point verification scan mode		Lights in red (Repeating)

Chapter 9 Communication

9.1 RS-232C Interface

With the RS-232C interface being selected, the scanner uses asynchronous data transmission and communicates with the host computer or external equipment via the RS-232C. You can set various communications conditions using the Bar coded parameter menu or configuration software (Scanner Setting). Barcode data read is transferred in the following format.

(1) Communications protocol

You can select either no protocol mode or ACK/NAK mode.

No protocol mode (default)

If the CTS signal is at a high level (Enable transmission), the scanner transmits barcode data read.

Note: The configuration software (Scanner Setting) provides CTS timeout settings from 100 ms to 9.9 s in 100-ms increments and two CTS signal control choices "controlled" and "not controlled."

ACK / NAK mode

If the CTS signal is at high level (Enable transmission), the scanner transmits barcode data read. After that, the scanner waits for and then processes a response. If the response is an ACK, the scanner normally ends the transmission; if it is a NAK, the scanner transmits the barcode data again.

Note: The configuration software (Scanner Setting) provides CTS timeout and ACK/NAK response settings each from 100 ms to 9.9 s in 100-ms increments.

(2) RTS signal control protocol

You can select either the scanner ready mode or the data ready mode.

Scanner ready mode (default)

The RTS signal goes High and stays at a high level when the scanner is ready to communicate at power on. Make sure that the RTS signal is at a high level when transmitting a command from the host to the scanner.

Data ready mode

The RTS signal goes High before the scanner transmits data to the host and goes Low after the data transmission is completed.

Commands can be transmitted from the host to the scanner regardless of the level of the RTS signal. However, there is a short time when commands cannot be transmitted to the scanner after power has been turned on.

(3) Transmission speed

There are six transmission speeds available, ranging from 4800 bps to 115200 bps (default: 9600 bps).

(4) Transfer Characters

Transfer Characters that the scanner transfers are all ASCII codes. The frame format has the following parameters.

Data bits : 7 bits or 8 bits (default)
Parity : Odd, Even, or None (default)
Stop bits : 1 bit (default) or 2 bits

Note: When data contains binary data or 2-byte codes, selecting "7 bits" for the data bits transfers the 2-byte codes with the most significant bits trimmed.

9.2 USB-COM Interface

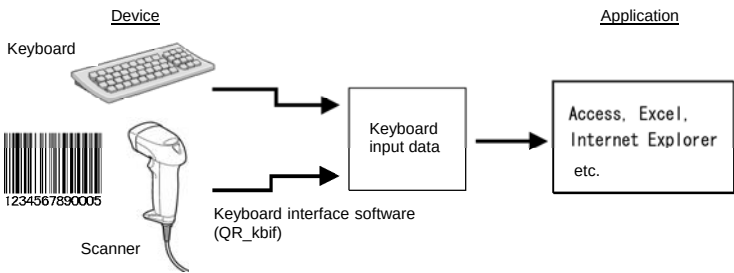
This scanner is compliant with USB 1.1 (Universal Serial Bus Specification Revision 1.1).

Installing the dedicated Active USB-COM port driver to the host computer allows the USB-COM interface to operate in communications applications using the conventional serial port.

Note: Entering data transferred from the scanner via the USB-COM interface directly to application (e.g., Access, Excel, and Internet Explorer) running on the host computer requires the keyboard interface software(QR_kbif)*. As shown below, the QR_kbif converts the data read into the keying format and passes it to applications in the manner as if it is coming from the keyboard. It is, therefore, possible for applications capable of accepting keyed data to handle the data read by the scanner.

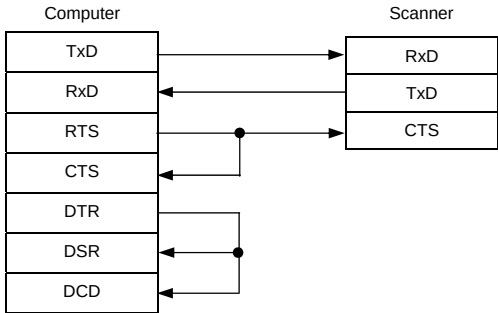
* Registered users can download the keyboard interface software (QR_kbif) from QBdirect, their customer support section on the Denso Wave website at no extra charge. For further details on QBdirect or to register, visit the following URL.

<http://www.qbdirect.net>



■ Notes for use

- If you connect the scanner to your computer first time or have changed the COM port for the scanner or hub, then confirm the COM port number on the Windows Device Manager or the like before use.
- If you want to use two or more communications processors (software) or scanners concurrently on your computer, be sure to assign a unique COM port number to each of them.
- If the host computer switches to the suspend mode when any communications software is running and recovers from that suspend mode, the software may freeze in some computers. Quit and restart the software.
- It is not necessary to make settings such as transmission speed, data bits, parity, and stop bits (which are required for communications software using a conventional serial port) since the USB interface ignores those settings. The flow control should be set to “Hardware (RTS/CTS)” or “None.”
- The virtual COM port on the computer and the scanner are connected with each other as shown below.



■ Communication protocols

You can select either no protocol mode or ACK/NAK mode.

No protocol mode (default)

If the CTS signal is at a high level (Enable transmission), the scanner transmits barcode data read.

Note: The configuration software (Scanner Setting) provides CTS timeout settings from 100 ms to 9.9 s in 100-ms increments and two CTS signal control choices “controlled” and “not controlled.”

ACK / NAK mode

If the CTS signal is at high level (Enable transmission), the scanner transmits barcode data read. After that, the scanner waits for and then processes a response. If the response is an ACK, the scanner normally ends the transmission; if it is a NAK, the scanner transmits the barcode data again.

Note: The configuration software (Scanner Setting) provides CTS timeout and ACK/NAK response settings each from 100 ms to 9.9 s in 100-ms increments.

9.3 USB Keyboard Interface

The USB keyboard interface requires no dedicated device driver. Data read by the scanner can be entered to the cursor position in your application.

The USB keyboard interface operates in conformity with the following:

- Universal Serial Bus (USB) Device Class Definition for Human Interface Devices (HID) Version 1.11
- Universal Serial Bus (USB) HID Usage Tables Version 1.11 keyboard

(1) CAPS Lock state

Select the CAPS Lock ON or OFF to match the state of the connected keyboard. (Default: CAPS Lock OFF)

(2) Keyboard type

Select the type of the connected keyboard. (Default : Type 101, US English)

(3) Numeric data transmission format

Select the "inboard numeric keys" or "numeric keypad" on the connected keyboard.
(Default : Inboard numeric keys)

(4) Data transmission interval

Select the data transmission interval to be applied when the scanner sends data read to the host computer. There are seven choices from 1 ms to 100 ms (default: 10 ms).

9.4 Communication Format

Select one of the following two data transmission formats.

Header	Scanner ID	Code ID mark	Prefix	No. of digit				Code data	Suffix	Terminator	BCC
				n1	n2	n3	N4				

Header	Scanner ID	Prefix	Code ID mark	No. of digit				Code data	Suffix	Terminator	BCC
				n1	n2	n3	n4				

(1) Header / Terminator

The following choices are available.

RS-232C interface, USB-COM interface

Header: None (default), STX, or user-defined one

Terminator: CR (default), none, LF, CR/LF, ETX, or user-defined one

USB keyboard interface

Header: None (default), TAB, ESC, ENTER or others

Terminator: None, TAB, ESC, ENTER (default) or others

For details, refer to Chapter 10.

(2) Scanner ID

A scanner ID is a unique serial number assigned to an individual scanner at the time of shipment. It consists of six numerals.

(3) Prefix/Suffix

A prefix or suffix consists of up to eight ASCII characters (00h to FFh). You can set a prefix or suffix with the configuration software (Scanner Setting). (Default: No prefix or suffix)

(4) BCC

The Block Character Check (BCC) exclusive-OR all bits at the same bit level in characters following the header and preceding the terminator in a transmission block to generate a horizontal parity byte to be transferred in a binary code. The BCC can be enabled or disabled. If no header is prefixed or the USB keyboard interface is selected, no BCC will be transferred.

(5) Code ID mark

This optional field specifies the code ID mark identifying a barcode symbology. Five types of code ID marks (Type 1, Type 2, Type 3, Type 4, and user-defined) are available as listed below.

The code mark type 4 has two output modes “Coupling” and “Separate.”

Coupling : In a UPC/EAN symbol with an add-on, the same code ID mark is assigned to the main portion and the add-on portion of the symbol.

Separate : In a UPC/EAN symbol with an add-on, the different code ID marks are individually assigned to the main portion and the add-on portion of the symbol.

It shall be a maximum of Four bytes long and consist of ASCII characters (00h to FEh).

Code type			Code ID mark				
			Type1	Type2	Type3	Type4 ^(Note2)	
						Coupling	Separate
UPC-A	No Add-on		A			]X0	
	With two-digit Add-on	Main	A			]X1	]X0
		Add-on	None				]X1
	With five-digit Add-on	Main	A			]X2	]X0
		Add-on	None				]X2
UPC-E	No Add-on		C	E	A	]X0	
	With two-digit Add-on	Main				]X1	]X0
		Add-on	None				]X1
	With five-digit Add-on	Main	C	E	A	]X2	]X0
		Add-on	None				]X2
EAN-13	No Add-on		A	F	A	]E0	
	With two-digit Add-on	Main				]E1	]E0
		Add-on	None				]E1
	With five-digit Add-on	Main	A	F	A	]E2	]E0
		Add-on	None				]E2
EAN-8	No Add-on		B	FF	A	]E4	
	With two-digit Add-on	Main				]E5	]E4
		Add-on	None				]E1
	With five-digit Add-on	Main	B	FF	A	]E6	]E4
		Add-on	None				]E2
Standard 2 of 5 (short)			H		G	]R0	
Standard 2 of 5 (normal)			H		G	]S0	
Interleaved 2 of 5			I		F	]Im	
CODE39			M		B	]Am	
CODE39 Full ASCII			M		B	]Am	
CODE32			M		B	]X0	

CODABAR (NW-7)	N	C	JFm
CODE93	L	E	JG0
CODE128	K	D	JCm
GS1-128 (EAN-128)	W	K	JC1
MSI	P	J	JMm
Plessey	T		JP0
GS1 DataBar (RSS) ^(Note1)	R		Je0

Note 1 : GS1 DataBar (RSS) refer to all of the following code:

GS1 DataBar Omnidirectional (RSS-14),
GS1 DataBar Truncated (RSS-14 Truncated), GS1 DataBar Limited (RSS-14 Limited),
GS1 DataBar Stacked (RSS-14 Stacked), GS1 DataBar Expanded (RSS Expanded),
GS1 DataBar Stacked Omnidirectional (RSS-14 Stacked Omnidirectional) and
GS1 DataBar Expanded Stacked (RSS Expanded Stacked).

Note 2 : Code ID mark Type4 is a code mark system complying with "Guidelines on Symbology Identifiers" of AIM USA. Ending character "m" differs depending on transmission data format of barcode system.

Code Type	"m" (Modifier character)	Option
Interleaved 2 of 5	0	Enabled without C/D
	1	Enabled with C/D, with C/D transmitted
	3	Enabled with C/D, with C/D not transmitted
CODE39 CODE39 Full ASCII	0	Enabled without C/D
	1	Enabled with C/D, with C/D transmitted
	3	Enabled with C/D, without C/D transmitted
CODABAR (NW-7)	0	Enabled without C/D
	1	Enabled with C/D, with C/D transmitted
	3	Enabled with C/D, without C/D transmitted
CODE128	0	1st and 2nd characters from start code do not contain FNC1.
	2	2nd characters from start code is FNC1.
MSI	0	Enabled with 1 digit of C/D, with C/D transmitted
	1	Enabled with 2 digits of C/D, with C/D transmitted
	2	Enabled with 1 digit of C/D, without C/D transmitted
	3	Enabled with 2 digits of C/D, without C/D transmitted
	4	Enabled without C/D

C/D : Check digit

Example :]I3] : Flag character (ASCII 93h)
1 : Code character (Interleaved 2 of 5)
3 : Modifier character (See the table above)

For example, in Interleaved 2 of 5, when "Enabled with C/D" and "without C/D transmitted" is set, code ID mark is "J]3".

Note 3 : For code ID marks not compliant with the AIM USA "Guidelines on Symbology Identifiers," same characters as ones defined in Type 1 apply.

(6) Number of digits

Indicates the number of barcode data digits in four digits (four bytes) or two digits (two bytes), however, the number of digits is omitted for UPC and EAN codes(excluding GS1-128(EAN-128)).

It is possible to select whether transfer of the number of digits is required.

When four digits(four bytes) transferred:

n1 : Units of 1000 (0 - 9)
n2 : Units of 100 (0 - 9)
n3 : Units of 10 (0 - 9)
n4 : Units of 1 (0 - 9)

When two digits(two bytes) transferred:

n1 : Units of 10 (0 - 9)
n2 : Units of 1 (0 - 9)

Note : However, 99 is transferred if the data byte count exceeds 99 bytes.

(7) Code data

UPC-A

You can select whether or not to transmit the padding character "0," number system character "S," and a check digit to the host. Disabling the transmission of the number system character "S" automatically disables the transmission of the padding character "0."

The conversion to the GTIN format is selectable. For the GTIN format conversion, refer to Section 9.5.

Conversion to GTIN format prohibited

0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D

0 : Adjust the number of digits

S : Number system characters

UPC-A with Add-on

A code ID mark precedes add-on code data under the conditions "Code ID mark: Type 4" and "Code ID mark output mode: Separating." (For details about the code ID mark, refer to (5) Code ID mark)

The conversion to the GTIN format is selectable. For the GTIN format conversion, refer to Section 9.5.

When the conversion to the GTIN format is disabled, the following formats apply.

With 2-digit add-on :

0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D X₁₁ X₁₂

With 5-digit add-on :

0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D X₁₁ X₁₂ X₁₃ X₁₄ X₁₅

0 : Adjust the number of digits

S : Number system characters

X₁₁₋₁₅ : Add-on code data

UPC-E

You can select whether or not to transmit the padding character "0," number system character "S," and a check digit to the host. Disabling the transmission of the number system character "S" automatically disables the transmission of the padding character "0."

The conversion to the GTIN format or to the UPC-A are selectable. For the GTIN format conversion, refer to Section 9.5.

When the conversion to the GTIN format is disabled, the following formats apply.

Conversion to UPC-A disabled

0 X₁ X₂ X₃ X₄ X₅ X₆ C/D

Conversion to UPC-A enabled

X₆=0 - 2 0 S X₁ X₂ X₆ 0 0 0 0 X₃ X₄ X₅ C/D

X₆=3 0 S X₁ X₂ X₃ 0 0 0 0 0 X₄ X₅ C/D

X₆=4 0 S X₁ X₂ X₃ X₄ 0 0 0 0 0 X₅ C/D

X₆=5 - 9 0 S X₁ X₂ X₃ X₄ X₅ 0 0 0 0 X₆ C/D

0 : Adjust the number of digits

S : Number system characters

UPC-E with add-on

A code ID mark precedes add-on code data under the conditions "Code ID mark: Type 4" and "Code ID mark output mode: Separating." (For details about the code ID mark, refer to (5) Code ID mark)

The conversion to the GTIN format or to the UPC-A are selectable. For the GTIN format conversion, refer to Section 9.5.

When the conversion to the GTIN format is disabled, the following formats apply.

With 2-digit add-on :

Conversion to UPC-A disabled

0 X₁ X₂ X₃ X₄ X₅ X₆ C/D X₇ X₈

Conversion to UPC-A enabled

X₆=0 - 2 0 S X₁ X₂ X₆ 0 0 0 0 X₃ X₄ X₅ C/D X₇ X₈

X₆=3 0 S X₁ X₂ X₃ 0 0 0 0 0 X₄ X₅ C/D X₇ X₈

X₆=4 0 S X₁ X₂ X₃ X₄ 0 0 0 0 0 X₅ C/D X₇ X₈

X₆=5 - 9 0 S X₁ X₂ X₃ X₄ X₅ 0 0 0 0 X₆ C/D X₇ X₈

With 5-digit add-on :

Conversion to UPC-A disabled

0 X₁ X₂ X₃ X₄ X₅ X₆ C/D X₇ X₈ X₉ X₁₀ X₁₁

Conversion to UPC-A enabled

X₆=0 - 2 0 S X₁ X₂ X₆ 0 0 0 0 X₃ X₄ X₅ C/D X₇ X₈ X₉ X₁₀ X₁₁

X₆=3 0 S X₁ X₂ X₃ 0 0 0 0 0 X₄ X₅ C/D X₇ X₈ X₉ X₁₀ X₁₁

X₆=4 0 S X₁ X₂ X₃ X₄ 0 0 0 0 0 X₅ C/D X₇ X₈ X₉ X₁₀ X₁₁

X₆=5 - 9 0 S X₁ X₂ X₃ X₄ X₅ 0 0 0 0 X₆ C/D X₇ X₈ X₉ X₁₀ X₁₁

0 : Adjust the number of digits

S : Number system characters

X₇₋₁₁ : Add-on code data

EAN-13

You can select whether or not to transmit the two prefix characters “P₁” and “P₂” and a check digit to the host. The conversion to the ISBN/ISSN format is selectable. Enabling the conversion allows EAN-13 code with prefix characters 978 or 979 to be converted into the ISBN format, and EAN-13 code with prefix characters 977, into the ISSN format.

The conversion to the GTIN format is also selectable. For the GTIN format conversion, refer to Section 9.5.

When the conversion to the GTIN format is disabled, the following formats apply.

Conversion to ISBN / ISSN disabled

P₁ P₂ P₃ X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ C/D

P_n: Prefix characters

Conversion to ISBN / ISSN enabled

To the ISBN format

X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ C/D(*1)

To the ISSN format

X₁ X₂ X₃ X₄ X₅ X₆ X₇ C/D(*1)

(*1) Check digits in the ISBN/ISSN format are calculated (MOD-11) and transferred to the host.

EAN-13 with add-on

A code ID mark precedes add-on code data under the conditions “Code ID mark: Type 4” and “Code ID mark output mode: Separating.” (For details about the code ID mark, refer to (5) Code ID mark)

The conversion to the GTIN format is selectable. For the GTIN format conversion, refer to Section 9.5.

When the conversion to the GTIN format is disabled, the following formats apply.

With 2-digit add-on :

P₁ P₂ P₃ X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ C/D X₁₀ X₁₁

With 5-digit add-on :

P₁ P₂ P₃ X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ C/D X₁₀ X₁₁ X₁₂ X₁₃ X₁₄

P_n: Prefix characters

X₁₀₋₁₄: Add-on code data

EAN-8

You can select whether or not to transmit a check digit to the host. The conversion to EAN-13 is selectable.

The conversion to the GTIN format is also selectable. For the GTIN format conversion, refer to Section 9.5.

When the conversion to the GTIN format is disabled, the following formats apply.

Conversion to EAN-13 disabled

P₁ P₂ P₃ X₁ X₂ X₃ X₄ C/D

Conversion to EAN-13 enabled

0 0 0 0 0 P₁ P₂ P₃ X₁ X₂ X₃ X₄ C/D

P_n: Prefix characters

EAN-8 with add-on

A code ID mark precedes add-on code data under the conditions “Code ID mark: Type 4” and “Code ID mark output mode: Separating.” (For details about the code ID mark, refer to (5) Code ID mark)

The conversion to the GTIN format is selectable. For the GTIN format conversion, refer to Section 9.5.

When the conversion to the GTIN format is disabled, the following formats apply.

With 2-digit add-on:

$P_1 P_2 P_3 X_1 X_2 X_3 X_4 C/D X_5 X_6$

With 5-digit add-on:

$P_1 P_2 P_3 X_1 X_2 X_3 X_4 C/D X_5 X_6 X_7 X_8 X_9$

P_n : Prefix characters

X_{5-9} : Add-on code data

CODE39

Code data read will be transmitted as is.

You can select whether or not to transmit start and stop codes (“ * ”).

Interleaved 2 of 5, Standard 2 of 5

The scanner transmits code data read, starting from the character following the start code to the one preceding the stop code. No start/stop codes will be transmitted.

CODABAR (NW-7)

The scanner transmits code data read including the start/stop codes. You can select whether or not to transmit start/stop codes.

CODE128, GS1-128 (EAN-128)

The scanner transmits code data read, starting from the character following the start code to the one preceding the check digit. Start/stop codes, FNC codes, or check digit will not be transmitted. Note that FNC1 placed in character positions other than the 1st and 2nd ones from the start code will be converted to GS (1Dh) and transferred.

The conversion to the GTIN format is also selectable. For the GTIN format conversion, refer to Section 9.5.

CODE93

The scanner transmits code data read, excluding start and stop codes and a check digit.

GS1 DataBar (RSS)

Code data read will be transmitted as is.

The conversion to the GTIN format is also selectable. For the GTIN format conversion, refer to Section 9.5.

MSY, Plessey

The data, starting from the character after the start pattern, to the one before the stop pattern, are transmitted in order.

9.5 GTIN Format Conversion

Enabling the GTIN (Global Trade Item Number) format conversion allows UPC-A, UPC-E, EAN-13, EAN-8, and Interleaved 2 of 5 (14-digit) data to output in the GTIN format. It also allows GS1 DataBar (RSS) and GS1-128 (EAN-128) data in the GTIN format to output in the EAN format (product code format).

Note : Under any of the following conditions, the GTIN format conversion is invalid.

- In reading barcode types specified for multi-line barcode reading
- In any of the data edit modes (data extraction mode, data substitution mode, and data blocksorting mode)

(1) Conversion from UPC / EAN / Interleaved 2 of 5 (14-digit) to GTIN format

Conversion provides two choices--16- and 14-digit GTIN formats. The former adds the Application Identifier (AI) "01" and Package Indicator PI as a prefix, and the latter, a PI only.

If the GTIN format conversion is enabled, however, the output formats available for UPC-A, UPC-E, EAN-13, and EAN-8 do not apply.

UPC-A

Data read

0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D

0 : Adjust the number of digits

S : Number system characters

Conversion to 16-digit GTIN format (AI "01" and PI added)

0 1 PI 0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D (*1)

(*1) Check digits are calculated again and transferred regardless of the transmission specified.

Conversion to 14-digit GTIN format (PI added)

PI 0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D (*2)

(*2) Check digits are calculated again and transferred regardless of the transmission specified.

UPC-A with add-on

Data read

With 2-digit add-on:

0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D X₁₁ X₁₂

With 5-digit add-on:

0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D X₁₁ X₁₂ X₁₃ X₁₄ X₁₅

0 : Adjust the number of digits

S : Number system characters

X₁₁₋₁₅ : Add-on code data

Conversion to 16-digit GTIN format (AI "01" and PI added)

With 2-digit add-on:

0 1 PI 0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D X₁₁ X₁₂ (*1)

With 5-digit add-on:

0 1 PI 0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D X₁₁ X₁₂ X₁₃ X₁₄ X₁₅ (*1)

(*1) Check digits are calculated again and transferred regardless of the transmission specified.

Conversion to 14-digit GTIN format (PI added)

With 2-digit add-on:

PI 0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D X₁₁ X₁₂ (*2)

With 5-digit add-on:

PI 0 S X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ C/D X₁₁ X₁₂ X₁₃ X₁₄ X₁₅ (*2)

(*2) Check digits are calculated again and transferred regardless of the transmission specified.

UPC-E

Data read

0 X₁ X₂ X₃ X₄ X₅ X₆ C/D

0 : Adjust the number of digits

Conversion to 16-digit GTIN format (AI "01" and PI added)

X₆=0 - 2 0 1 PI 0 0 X₁ X₂ X₆ 0 0 0 0 X₃ X₄ X₅ C/D (*1)

X₆=3 0 1 PI 0 0 X₁ X₂ X₃ 0 0 0 0 X₄ X₅ C/D (*1)

X₆=4 0 1 PI 0 0 X₁ X₂ X₃ X₄ 0 0 0 0 X₅ C/D (*1)

X₆=5 - 9 0 1 PI 0 0 X₁ X₂ X₃ X₄ X₅ 0 0 0 0 X₆ C/D (*1)

(*1) Check digits are calculated again and transferred regardless of the transmission specification.

Conversion to 14-digit GTIN format (PI added)

X₆=0 - 2 PI 0 S X₁ X₂ X₆ 0 0 0 0 X₃ X₄ X₅ C/D (*2)

X₆=3 PI 0 S X₁ X₂ X₃ 0 0 0 0 X₄ X₅ C/D (*2)

X₆=4 PI 0 S X₁ X₂ X₃ X₄ 0 0 0 0 X₅ C/D (*2)

X₆=5 - 9 PI 0 S X₁ X₂ X₃ X₄ X₅ 0 0 0 0 X₆ C/D (*2)

(*2) Check digits are calculated again and transferred regardless of the transmission specified.

UPC-E with add-on

Data read

With 2-digit add-on:

0 X₁ X₂ X₃ X₄ X₅ X₆ C/D X₇ X₈

With 5-digit add-on:

0 X₁ X₂ X₃ X₄ X₅ X₆ C/D X₇ X₈ X₉ X₁₀ X₁₁

0 : Adjust the number of digits

X₇₋₁₁ : Add-on code data

Conversion to 16-digit GTIN format (AI "01" and PI added)

With 2-digit add-on:

X₆=0 - 2 0 1 PI 0 S X₁ X₂ X₆ 0 0 0 0 X₃ X₄ X₅ C/D X₇ X₈ (*1)

X₆=3 0 1 PI 0 S X₁ X₂ X₃ 0 0 0 0 X₄ X₅ C/D X₇ X₈ (*1)

X₆=4 0 1 PI 0 S X₁ X₂ X₃ X₄ 0 0 0 0 X₅ C/D X₇ X₈ (*1)

X₆=5 - 9 0 1 PI 0 S X₁ X₂ X₃ X₄ X₅ 0 0 0 0 X₆ C/D X₇ X₈ (*1)

With 5-digit add-on:

X₆=0 - 2 0 1 PI 0 S X₁ X₂ X₆ 0 0 0 0 X₃ X₄ X₅ C/D X₇ X₈ X₉ X₁₀ X₁₁ (*1)

X₆=3 0 1 PI 0 S X₁ X₂ X₃ 0 0 0 0 X₄ X₅ C/D X₇ X₈ X₉ X₁₀ X₁₁ (*1)

X₆=4 0 1 PI 0 S X₁ X₂ X₃ X₄ 0 0 0 0 X₅ C/D X₇ X₈ X₉ X₁₀ X₁₁ (*1)

X₆=5 - 9 0 1 PI 0 S X₁ X₂ X₃ X₄ X₅ 0 0 0 0 X₆ C/D X₇ X₈ X₉ X₁₀ X₁₁ (*1)

(*1) Check digits are calculated again and transferred regardless of the transmission specified.

Conversion to 14-digit GTIN format (PI added)

With 2-digit add-on:

X₆=0 - 2 PI 0 S X₁ X₂ X₆ 0 0 0 0 X₃ X₄ X₅ C/D X₇ X₈ (*2)

X₆=3 PI 0 S X₁ X₂ X₃ 0 0 0 0 X₄ X₅ C/D X₇ X₈ (*2)

X₆=4 PI 0 S X₁ X₂ X₃ X₄ 0 0 0 0 X₅ C/D X₇ X₈ (*2)

X₆=5 - 9 PI 0 S X₁ X₂ X₃ X₄ X₅ 0 0 0 0 X₆ C/D X₇ X₈ (*2)

With 5-digit add-on:

X₆=0 - 2 PI 0 S X₁ X₂ X₆ 0 0 0 0 X₃ X₄ X₅ C/D X₇ X₈ X₉ X₁₀ X₁₁ (*2)

X₆=3 PI 0 S X₁ X₂ X₃ 0 0 0 0 X₄ X₅ C/D X₇ X₈ X₉ X₁₀ X₁₁ (*2)

X₆=4 PI 0 S X₁ X₂ X₃ X₄ 0 0 0 0 X₅ C/D X₇ X₈ X₉ X₁₀ X₁₁ (*2)

X₆=5 - 9 PI 0 S X₁ X₂ X₃ X₄ X₅ 0 0 0 0 X₆ C/D X₇ X₈ X₉ X₁₀ X₁₁ (*2)

(*2) Check digits are calculated again and transferred regardless of the transmission specified.

EAN-13

Data read

P₁ P₂ P₃ X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ C/D

P_n : Prefix characters

Conversion to 16-digit GTIN format (AI "01" and PI added)

0 1 PI P₁ P₂ P₃ X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ C/D (*1)

(*1) Check digits are calculated again and transferred regardless of the transmission specified.

Conversion to 14-digit GTIN format (PI added)

PI P₁ P₂ P₃ X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ C/D (*2)

(*2) Check digits are calculated again and transferred regardless of the transmission specified.

EAN-13 with add-on

Data read

With 2-digit add-on:

P₁ P₂ P₃ X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ C/D X₁₀ X₁₁

With 5-digit add-on:

P₁ P₂ P₃ X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ C/D X₁₀ X₁₁ X₁₂ X₁₃ X₁₄

P_n : Prefix characters

X₁₀₋₁₄ : Add-on code data

Conversion to 16-digit GTIN format (AI "01" and PI added)

With 2-digit add-on:

0 1 PI P₁ P₂ P₃ X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ C/D X₁₀ X₁₁ (*1)

With 5-digit add-on:

0 1 PI P₁ P₂ P₃ X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ C/D X₁₀ X₁₁ X₁₂ X₁₃ X₁₄ (*1)

(*1) Check digits are calculated again and transferred regardless of the transmission specified.

Conversion to 14-digit GTIN format (PI added)

With 2-digit add-on:

PI P₁ P₂ P₃ X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ C/D X₁₀ X₁₁ (*2)

With 5-digit add-on:

PI P₁ P₂ P₃ X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ C/D X₁₀ X₁₁ X₁₂ X₁₃ X₁₄ (*2)

(*2) Check digits are calculated again and transferred regardless of the transmission specified.

EAN-8

Data read

P₁ P₂ P₃ X₁ X₂ X₃ X₄ C/D

P_n : Prefix characters

Conversion to 16-digit GTIN format (AI "01" and PI added)

0 1 PI 0 0 0 0 0 P₁ P₂ X₁ X₂ X₃ X₄ C/D (*1)

(*1) Check digits are calculated again and transferred regardless of the transmission specified.

Conversion to 14-digit GTIN format (PI added)

PI 0 0 0 0 0 P₁ P₂ X₁ X₂ X₃ X₄ C/D (*2)

(*2) Check digits are calculated again and transferred regardless of the transmission specified.

EAN-8 with add-on

Data read

With 2-digit add-on:

$P_1 P_2 X_1 X_2 X_3 X_4 C/D X_5 X_6$

With 5-digit add-on:

$P_1 P_2 X_1 X_2 X_3 X_4 C/D X_5 X_6 X_7 X_8 X_9$

P_n : Prefix characters

X_{6-10} : Add-on code data

Conversion to 16-digit GTIN format (AI "01" and PI added)

With 2-digit add-on:

$0\ 1\ PI\ 0\ 0\ 0\ 0\ 0\ P_1 P_2 X_1 X_2 X_3 X_4 C/D X_5 X_6 (*1)$

With 5-digit add-on:

$0\ 1\ PI\ 0\ 0\ 0\ 0\ 0\ P_1 P_2 X_1 X_2 X_3 X_4 C/D X_5 X_6 X_7 X_8 X_9 (*1)$

(*1) Check digits are calculated again and transferred regardless of the transmission specified.

Conversion to 14-digit GTIN format (PI added)

With 2-digit add-on:

$PI\ 0\ 0\ 0\ 0\ 0\ P_1 P_2 X_1 X_2 X_3 X_4 C/D X_5 X_6 (*2)$

With 5-digit add-on:

$PI\ 0\ 0\ 0\ 0\ 0\ P_1 P_2 X_1 X_2 X_3 X_4 C/D X_5 X_6 X_7 X_8 X_9 (*2)$

(*2) Check digits are calculated again and transferred regardless of the transmission specified.

Interleaved 2 of 5 (14-digit)

Data read

$X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} X_{11} X_{12} X_{13} C/D$

Conversion to GTIN format (AI "01" added)

$0\ 1\ X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9 X_{10} X_{11} X_{12} X_{13} C/D (*1)$

(*1) Check digits are calculated again and transferred regardless of the transmission specified.

(2) Conversion from GS1 DataBar (RSS) / GS1-128 (EAN-128) in GTIN format to EAN format

GS1 DataBar (RSS) or GS1-128 (EAN-128) data read in the GTIN format (16-digit with AI "01") can be converted to the EAN format if the conversion is enabled.

The conversion provides two choices--13- or 14-digit EAN formats. The former trims the Application Identifier (AI) "01" and Package Indicator PI, and the latter, a PI only.

GS1 DataBar (RSS)

Data read

0 1 PI X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ X₁₁ X₁₂ C/D

PI: Package indicator

Conversion to 13-digit EAN format (AI "01" and PI trimmed)

X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ X₁₁ X₁₂ C/D (*1)

(*1) Check digits are calculated again and transferred regardless of the transmission specified.

If the transmission of a code ID mark is enabled in the scanner, the code ID mark of EAN-13 is transferred.

Conversion to 14-digit EAN format (AI "01" trimmed)

PI X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ X₁₁ X₁₂ C/D

GS1-128 (EAN-128)

Data read

0 1 PI X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ X₁₁ X₁₂ X₁₃ C/D

PI: Package indicator

Conversion to 13-digit EAN format (AI "01" and PI trimmed)

X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ X₁₁ X₁₂ X₁₃ C/D (*1)

(*1) Check digits are calculated again and transferred regardless of the transmission specified.

If the transmission of a code ID mark is enabled in the scanner, the code ID mark of EAN-13 is transferred.

Conversion to 14-digit EAN format (AI "01" trimmed)

PI X₁ X₂ X₃ X₄ X₅ X₆ X₇ X₈ X₉ X₁₀ X₁₁ X₁₂ X₁₃ C/D

Chapter 10 Parameters and Defaults

Parameters in the chart below can be selected with Bar coded parameter menu or configuration software (Scanner Setting).
However, shaded parameters can be selected only with the configuration software (Scanner Setting).
All parameters are selected as default setting at shipment.

(1) Reading Mode Parameter Selection

Item	Parameter	Default	Reference
Data verification reading mode	Normal reading mode	*	Chapter 7 Section 7.1
	n-point verification mode		
	2-point verification mode		
Data editing mode	No editing	*	Chapter 7 Section 7.2
	Data extraction mode		
	Data conversion mode		
	Block sorting mode		
Double-read prevention	Enabled		Chapter 4
	Range of time duration 0.1 to 9.9 sec	0.3 sec	
Black-and-white inversion label reading	Normal black/white code	*	
	Automatic black/white discrimination		

(2) Interface Selection

Item	Parameter	Default	Reference
Interface	RS-232C interface	* (NOTE 1)	Chapter 9
	USB-COM interface		
	USB keyboard interface (NOTE 2)	* (NOTE 1)	

NOTE 1 : RS-232C or USB is determined automatically based on the connected interface cable
2 : The configuration software (Scanner Setting) cannot be used when the USB keyboard interface mode is selected for the scanner.

 : These can be selected only with the configuration software (Scanner Setting)

(3) RS-232C Interface Parameter Selection

Only valid when Interface Selection has been selected RS-232C interface.

Item	Parameter	Default	Reference
Communication mode	No protocol mode	*	Chapter 9 Section 9.1 (1)
	ACK/NAK mode		
Transmission speed	4800 bps		Chapter 9 Section 9.1 (3)
	9600 bps	*	
	19200 bps		
	38400 bps		
	57600 bps		
	115200 bps		
Data bit	7 bits		Chapter 9 Section 9.1 (4)
	8 bits	*	
Parity	ODD		
	EVEN		
	None	*	
Stop bit	1 bit	*	
	2 bit		
CTS signal control	Controlled		Chapter 9 Section 9.1 (1)
	Not controlled	*	
CTS signal observation time	0.1~9.9 sec	2.0 sec	Chapter 9 Section 9.1 (1)
ACK/NAK response confirmation time	0.1~9.9 sec	1.0 sec	
RTS signal control mode	Scanner ready mode	*	Chapter 9 Section 9.1 (2)
	Data ready mode		

(4) USB-COM Interface Parameter Selection

Only valid when Interface Selection has been selected USB-COM interface.

Item	Parameter	Default	Reference
Communication mode	No protocol mode	*	Chapter 9 Section 9.2
	ACK/NAK mode		
CTS signal control	Controlled		Chapter 9 Section 9.2
	Not controlled	*	
CTS signal observation time	0.1~9.9 sec	2 sec	Chapter 9 Section 9.2
ACK/NAK response confirmation time	0.1~9.9 sec	1 sec	
Remote wakeup	Enabled	*	Chapter 9 Section 9.2
	Disabled		

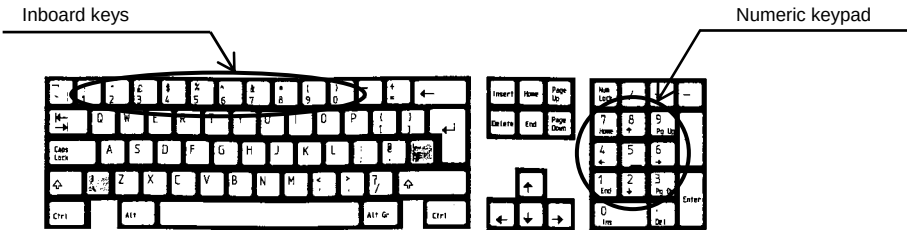
 : These can be selected only with the configuration software (Scanner Setting)

(5) USB keyboard Interface Parameter Selection

Only valid when Interface Selection has been selected USB keyboard interface.

Item	Parameter	Default	Reference
CAPS mode	Auto setting	*	Chapter 9 Section 9.3 (1) (NOTE 1)
	Manual setting		
CAPS LOCK state	CAPS LOCK OFF	*	Chapter 9 Section 9.3 (1) (NOTE 1)
	CAPS LOCK ON		
Keyboard type	US English (101 keyboard)	*	Chapter 9 Section 9.3 (2)
	Germany (102 keyboard)		
	French (102 keyboard)		
	UK English (102 keyboard)		
	Italian (102 keyboard)		
	Swedish (102 keyboard)		
	Japanese (106 keyboard)		
Numeric data (0 - 9) transmission mode	Inboard numeric keys	*	Chapter 9 Section 9.3 (3) (NOTE 3)
	Numeric keypad		

- NOTE 1 : To match the connected keyboard's CAPS LOCK state.
2 : Some application may not be outputted display correctly.
3 : Turn on the NUM LOCK on the host unit to send the numeric data characters in the numeric keypad format.



Example: US English (101 keyboard)

 : These can be selected only with the configuration software (Scanner Setting)

Item	Parameter	Default	Reference
Special key transmission mode	Enabled		(NOTE 4)
	Disabled	*	
Data transmission interval	1 msec	*	Chapter 9 Section 9.3 (4)
	5 msec		
	10 msec		
	15 msec		
	30 msec		
	50 msec		
	100 msec		
Remote wakeup	Enabled	*	Chapter 9 Section 9.3 (5)
	Disabled		

NOTE 4 : Whether or not the special keys, excluding the header and terminator in the transmission format, are transmitted to the host can be selected.

When the special key transmission is designated, data characters from E7h to FDh in the transmission data are substitution rule tabled below before they are transmitted.

Data from the Left SHIFT, Left CTRL and Left ALT keys is transmitted together with the data representing the subsequently selected character or key that was simultaneously pressed.

Upper digit Lower digit	E	F
0		↓
1		F1
2		F2
3		F3
4		F4
5		F5
6		F6
7	Left SHIFT	F7
8	Left CTRL	F8
9	Left ALT	F9
A	TAB	F10
B	ESC	F11
C	ENTER	F12
D	←	Right CTRL
E	↑	
F	→	

Special key substitution rule table

(6) Data Transmission Format Selection Common to All the Interfaces

Item	Parameter	Default	Reference
Code mark transmission	Enabled		Chapter 9 Section 9.4
	Disabled	*	
Code mark position	Before the prefix		Chapter 9 Section 9.4
	After the prefix	*	
Code mark type	Type1 (DENS01)	*	Chapter 9 Section 9.4 (5)
	Type2 (DENS02)		
	Type3		
	Type4 (AIM)		
	User-defined		
Code mark output mode	Coupling	*	Chapter 9 Section 9.4 (5)
	Separate		
Transmission of the number of digits (excl. UPC/EAN)	Enabled in 4 digits		Chapter 9 Section 9.4 (6)
	Enabled in 2 digits		
	Disabled	*	
Prefix transmission	Enabled		Chapter 9 Section 9.4 (3)
	Disabled	*	
Suffix transmission	Enabled		
	Disabled	*	
Scanner ID output	Enabled		Chapter 9 Section 9.4 (2)
	Disabled	*	
Conversion to GTIN format	Enabled		Chapter 9 Section 9.5
	Disabled	*	
Conversion type from UPC/EAN/Interleaved 2of5 (14 digit) to GTIN format	Convert to 16 digit	*	
	Convert to 14 digit		
	Disabled		
Conversion type from GS1 DataBar with GTIN format (RSS)/GS1-128(EAN-128) to EAN/JAN	Convert to 14 digit	*	
	Convert to 13 digit		
	Disabled		
Additional PI at the convesion from UPC/EAN/Interleaved 2of5 (14 digit) to GTIN	0~9	0	

 : These can be selected only with the configuration software (Scanner Setting).

(7) Data Transmission Format Selection for RS-232C/USB-COM

Item	Parameter	Default	Reference
Header	None	*	Chapter 9 Section 9.4 (1)
	STX		
	User-defined		
Terminator	None		
	ETX		
	CR	*	
	LF		
	CR + LF		
	User-defined		
BCC transmission	Enabled		Chapter 9 Section 9.4
	Disabled	*	

 : These can be selected only with the configuration software (Scanner Setting).

(8) Data Transmission Format Selection for USB Keyboard Interface

Item	Parameter	Default	Reference
Header	None	*	Chapter 9 Section 9.4 (1)
	STX		
	ETX		
	CR		
	LF		
	CR + LF		
	TAB		
	ESC		
	ENTER		
	ENTER (Right CTRL)		
	←		
	↑		
	→		
	↓		
	User-defined		
Terminator	None		
	STX		
	ETX		
	CR		
	LF		
	CR + LF		
	TAB		
	ESC		
	ENTER	*	
	ENTER (Right CTRL)		
	←		
	↑		
	→		
	↓		
	User-defined		

 : These can be selected only with the configuration software (Scanner Setting).

(9) Barcode Selections

UPC-A/E, EAN-13/8

Item	Parameter	Default	Reference
Reading UPC-A & EAN-13	Enabled	*	Chapter 9 Section 9.4
	Disabled		
C/D transmission of UPC-A	Enabled	*	Chapter 9 Section 9.4
	Disabled		
Transmission of UPC-A number system characters	Enabled	*	
	Disabled		
Transmission of head character to adjust the number of digits in UPC-A	Enabled	*	
	Disabled		
C/D transmission of EAN-13	Enabled	*	
	Disabled		
Transmission of EAN-13 country code	Enabled	*	Chapter 9 Section 9.4 (NOTE 1)
	Disabled		
Conversion to EAN-13 ISBN/ISSN format	Enabled		Chapter 9 Section 9.4
	Disabled	*	
Reading UPC-E	Enabled	*	
	Disabled		
C/D transmission of UPC-E	Enabled	*	
	Disabled		
Transmission of UPC-E number system characters	Enabled	*	
	Disabled		
Transmission of head character to adjust the number of digits in UPC-E	Enabled		
	Disabled	*	
Conversion from UPC-E to UPC-A	Enabled		
	Disabled	*	

NOTE 1 : A country code is consisted of the upper two digits of the prefix character of EAN-13 codes.

 : These can be selected only with the configuration software (Scanner Setting).

Item	Parameter	Default	Reference
Reading EAN-8	Enabled	*	Chapter 9 Section 9.4
	Disabled		
C/D transmission of EAN-8	Enabled	*	Chapter 9 Section 9.4
	Disabled		
Conversion from EAN-8 to EAN-13	Enabled		
	Disabled	*	
Reading 2-digit UPC/EAN add-on	Enabled		
	Disabled	*	
Reading 5-digit UPC/EAN add-on	Enabled		
	Disabled	*	
Reading UPC/EAN with add-on only	Enabled		
	Disabled	*	
UPC/EAN with add-on confirmation level	Disabled	*	
	Setting range: Level 1 to 3		

Interleaved 2 of 5

Item	Parameter	Default	Reference
Reading Interleaved 2 of 5	Enabled without C/D	*	Chapter 9 Section 9.4
	Enabled with C/D		
	Disabled		
C/D transmission of Interleaved 2 of 5	Enabled	*	(NOTE 1)
	Disabled		
Minimum number of readable digits for Interleaved 2 of 5	4 to 99 digits	4 digits	
Maximum number of readable digits for Interleaved 2 of 5		99 digits	

NOTE 1 : The parameter setting range is not equal to the number of Scanner's readable digits.

Standard 2 of 5

Item	Parameter	Default	Reference
Reading Standard 2 of 5	Enabled without C/D		Chapter 9 Section 9.4
	Enabled with C/D		
	Disabled	*	
C/D transmission of Standard 2 of 5	Enabled	*	(NOTE 1)
	Disabled		
Minimum number of readable digits for Standard 2 of 5	3 to 99 digits	3 digits	
Maximum number of readable digits for Standard 2 of 5		99 digits	

NOTE 1 : The parameter setting range is not equal to the number of Scanner's readable digits.

 : These can be selected only with the configuration software (Scanner Setting)

CODABAR(NW-7)

Item	Parameter	Default	Reference
Reading CODABAR(NW-7)	Enabled without C/D	*	Chapter 9 Section 9.4
	Enabled with C/D		
	Disabled		
C/D transmission of CODABAR (NW-7)	Enabled	*	
	Disabled		
Minimum number of readable digits for CODABAR(NW-7)	3 to 99 digits (incl. Start/stop codes)	4 digits	(NOTE 1)
Maximum number of readable digits for CODABAR(NW-7)		99 digits	
Transmission of CODABAR (NW-7) start/stop codes	Transmit a/b/c/d	*	
	Transmit A/B/C/D		
	Disabled		
Calculation method of C/D for CODABAR (NW-7)	MOD-16	*	
	7 check method		

NOTE 1 : The parameter setting range is not equal to the number of Scanner's readable digits.

CODE39

Item	Parameter	Default	Reference
Reading CODE39	Enabled without C/D	*	Chapter 9 Section 9.4
	Enabled with C/D		
	Disabled		
C/D transmission of CODE39	Enabled	*	
	Disabled		
Minimum number of readable digits for CODE39	1 to 99 digits (excl. Start/stop codes)	1 digit	(NOTE 1)
Maximum number of readable digits for CODE39		99 digits	
Transmission of CODE39 start/stop codes	Enabled		
	Disabled	*	
Conversion to CODE39 Full ASKEY	Enabled		
	Disabled	*	
Conversion from CODE39 to CODE32	Enabled		
	Disabled	*	
Transmission of the leading "A" of CODE32	Enabled		
	Disabled	*	
C/D confirmation of CODE32	Yes		
	No	*	

NOTE 1 : The parameter setting range is not equal to the number of Scanner's readable digits.

CODE128, GS1-128 (EAN-128)

Item	Parameter	Default	Reference
Reading CODE128	Enabled	*	Chapter 9 Section 9.4 (NOTE 2)
	Disabled		
Reading GS1-128 (EAN-128)	Enabled	*	
	Disabled		
Minimum number of readable digits for CODE128	1 to 99 digits (excl. start/stop codes and 1-digit C/D)	1 digit	(NOTE 1)
Maximum number of readable digits for CODE128		99 digits	
FNC1 transmission of CODE128	Disabled		
	Convert to GS before Transmission	*	
Minimum number of readable digits for GS1-128 (EAN-128)	1 to 99 digits (excl. start/stop codes and 1-digit C/D)	1 digit	(NOTE 1)
Maximum number of readable digits for GS1-128 (EAN-128)		99 digits	
FNC1 transmission of GS1-128(EAN-128)	Disabled		
	Convert to GS before Transmission	*	

NOTE 1 : The parameter setting range is not equal to the number of Scanner's readable digits.

2 : With the barcode menu, CODE128, GS-128(EAN-128) will be enabled / disabled at the same time.

CODE93

Item	Parameter	Default	Reference
Reading CODE93	Enabled		
	Disabled	*	
Minimum number of readable digits for CODE93	1 to 99 digits (excl. start/stop codes and 2-digit C/D)	1 digit	(NOTE 1)
Maximum number of readable digits for CODE93		99 digits	

NOTE 1 : The parameter setting range is not equal to the number of Scanner's readable digits.

MSI

Item	Parameter	Default	Reference
Reading MSI	Enabled without C/D		
	Enabled with C/D (1 digit)		
	Enabled with C/D (1 digits)		
	Disabled	*	
C/D transmission of MSI	Enabled	*	
	Disabled		
Minimum number of readable digits for MSI	3 to 99 digits (incl. C/D)	3 digits	(NOTE 1)
Maximum number of readable digits for MSI		99 digits	

NOTE 1 : The parameter setting range is not equal to the number of Scanner's readable digits.

 : These can be selected only with the configuration software (Scanner Setting).

Plessey

Item	Parameter	Default	Reference
Reading Plessey	Enabled		
	Disabled	*	
Mode of reading Plessey	Single		
	Dual	*	
Minimum number of readable digits for Plessey	4 to 99 digits (incl. 2-digits C/D)	4 digits	(NOTE 1)
Maximum number of readable digits for Plessey		99 digits	

NOTE 1 : The parameter setting range is not equal to the number of Scanner's readable digits.

GS1 DataBar (RSS)

Item	Parameter	Default	Reference
Reading GS1 DataBar Omnidirectional & GS1 DataBar Truncated (NOTE 1)	Enabled		
	Disabled	*	
Reading GS1 DataBar Stacked & GS1 DataBar Stacked Omnidirectional (NOTE 2)	Enabled		
	Disabled	*	
Reading GS1 DataBar Limited (NOTE 1)	Enabled		
	Disabled	*	
Reading GS1 DataBar Expanded (NOTE 1)	Enabled		
	Disabled	*	
Reading GS1 DataBar Expanded Stacked (NOTE 2)	Enabled		
	Disabled	*	
FNC1 transmission of GS1 DataBar Expanded	Convert to GS before Transmission	*	
	Disabled		
Minimum number of readable digits for GS1 DataBar Expanded & GS1 DataBar Expanded Stacked (NOTE 1) (NOTE 2)	1 to 99 digits	1 digit	(NOTE 3)
Maximum number of readable digits for GS1 DataBar Expanded & GS1 DataBar Expanded Stacked (NOTE 1) (NOTE 2)		99 digits	

NOTE 1 : These show GS1 DataBar Omnidirectional(RSS-14), GS1 DataBar Truncated(RSS-14 Truncated), GS1 DataBar Limited(RSS Limited), and GS1 DataBar Expanded(RSS Expanded).

2 : These show GS1 DataBar Stacked(RSS-14 Stacked), GS1 DataBar Stacked Omnidirectional (RSS-14 Stacked Omnidirectional), and GS1 DataBar Expanded Stacked(RSS Expanded Stacked).

3 : The parameter setting range is not equal to the number of Scanner's readable digits.

(10) Trigger Switch Control

Item	Parameter	Default	Reference
Trigger switch control	Auto off mode	*	Chapter 6 Section 6.1
	Momentary switching mode		
	Momentary switching mode (Inverted type)		
	Alternate switching mode		
	Continuous reading mode 1		
	Continuous reading mode 2		
	Auto sensing mode		Chapter 6 Section 6.3
	Auto stand mode		
Auto off mode setting	Normal	*	Chapter 6 Section 6.1
	One shot		
Auto off mode (one shot) ON duration	1 sec		Chapter 6 Section 6.1
	2 sec		
	3 sec		
	4 sec		
	5 sec	*	
Auto sensing bar code detection level	High		Chapter 6 Section 6.3
	Medium	*	
	Low		
Time from Auto stand mode to Auto sensing	1 sec		Chapter 6 Section 6.3
	2 sec	*	
	3 sec		
	4 sec		
	5 sec		
	6 sec		
	7 sec		
	8 sec		
	9 sec		
Interface switching at power ON	Enabled		Chapter 2 Section 2.1
	Disabled	*	

 : These can be selected only with the configuration software (Scanner Setting).

(11) Beeper and LED indicator

Item	Parameter	Default	Reference
Beeping sound	Enabled	*	Chapter 8 Section 8.1
	Disabled		
Beeper frequency	Low (2.8 kHz)		
	Medium (3.0 kHz)	*	
	High (4.0 kHz)		
Beeper sound duration	Short (60 msec)		
	Medium (80 msec)	*	
	Long (120 msec)		
Beeping volume level	High	*	
	Medium		
	Low		
Reading confirmation sound	Single beep	*	
	Multiple beeps		
Beeping at power ON	Enabled		
	Disabled	*	
LED indicator	Enabled	*	Chapter 8 Section 8.2
	Disabled		

 : These can be selected only with the configuration software (Scanner Setting).

(12) Parameter Selection for Data Verification and Data Editing

Item	Parameter	Default	Reference
Verification method	Data string verification	*	Chapter 7 Section 7.1
	Data block verification		
Preset master registration	Enabled	*	
	Disabled		
Starting point of data string verification	1 to 999 digits in ASCII characters	1 digit	
Number of digits to be verified for data string verification (Preset master registration not made)	1 to 99 digits in ASCII characters	99 digits	
Starting point of data block verification.	1 to 99 digits in ASCII characters	1 digit	
Transmission of result when verification is OK	Disabled	*	
	Transmit code data		
	Transmit OK		
Transmission of result when verification is NG	Disabled	*	
	Transmit code data		
	Transmit NG		
Retry of verification after NG result (2-poin verification only)	Enabled		
	Disabled	*	
Verification range	Code type + barcode data	*	
	Barcode data only		
Applicable code for data editing	Select from the codes	Any code (NOTE 1)	Chapter 7 Section 7.2
Handling of edit errors	Transmit data regardless of edit result		
	Transmit data only when successful edit result	*	
Data extraction mode for editing	Data string mode	*	
	Data block mode		
	AI mode		
Start position of data string extraction	First character		
	Last character		
	Specified position	*	
End position of data string extraction	Last character	*	
	Specified "n"th digit		
	Specified position		
Start of data string to be extracted	1 to 9999 digits in ASCII characters	1 digit	
End of data string to be extracted	1 to 9999 digits in ASCII characters	9999 digits	

Item	Parameter	Default	Reference
Number of extracted digits (3 blocks max)	1 to 99 digits in ASCII characters	Not defined	

NOTE 1 : "Any code" means all data can be edited.

 : These can be selected only with the configuration software (Scanner Setting).

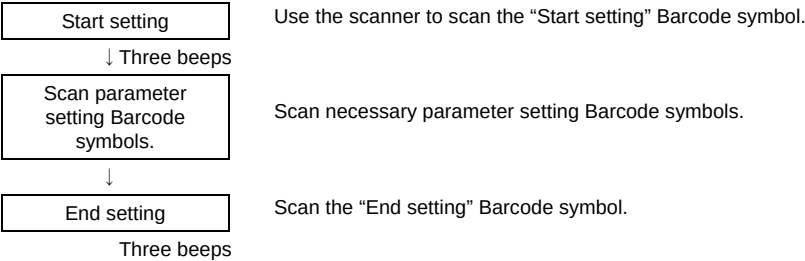
Item	Parameter	Default	Reference
AI mode	AI split mode	*	Chapter 7 Section 7.2
	AI parenthesis mode		
AI split mode: AI1 selection enable/disable	Enabled	*	
	Disabled		
AI split mode: AI2 selection enable/disable	Enabled		
	Disabled	*	
AI split mode: AI3 selection enable/disable	Enabled		
	Disabled	*	
AI split mode: AI selection AI1	Select from candidate AIs (NOTE 2)	00	
AI split mode: AI selection AI2	Select from candidate AIs (NOTE 2)	00	
AI split mode: AI selection AI3	Select from candidate AIs (NOTE 2)	00	
AI split mode: Delimiter	Header/Terminator	*	
	Comma		
	Tab		
Conversion mode: Number of characters and character type	16 characters max in ASCII characters	Not defined	Chapter 7 Section 7.2
Blocksorting mode: Number of blocks	2 to 5 blocks	2 blocks	
Blocksorting mode: Split position	1 to 9999 digits in ASCII characters	1 char.	
Blocksorting mode: Output order	BLOCK1 to BLOCK5	BLOCK1/ BLOCK2	

NOTE 2 : Refer the Chapter 7 "7.2.1.3 (3) AI table" about the detail of AI.

 : These can be selected only with the configuration software (Scanner Setting).

Chapter 11 Bar coded Parameter Menu

11.1 Parameter Setting Procedure Using the Bar coded Parameter Menu



Reading the “All defaults” Barcode symbol in the Bar coded parameter menu makes all items in the menu revert to the factory defaults.

11.2 Bar coded Parameter Menu

■ Menu control (Starting/Ending the Setting Procedure and Reverting to Defaults)



Start setting



End setting



All defaults



Cancel

The beeper volume can be set by reading the following Barcode symbol only. No “Start setting” or “End setting” Barcode symbol required to be scanned.

Adjusting the beeper volume

Reading this Barcode symbol cycles the beeper volume through High, Medium and Low. The factory default is High.



Beeper volume

USB interface to the host



< USB keyboard interface >
(default)



USB-COM interface

■ Communications parameters for RS-232C interface

Procedure



< No protocol mode >



ACK/NAK mode

Transmission speed



4800bps



< 9600bps >



19200bps



38400bps



57600bps



115200bps

Data bit



7bits

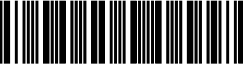


< 8bits >

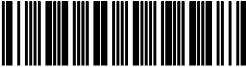
Parity



< None >



Even parity



Odd parity

Stop bit



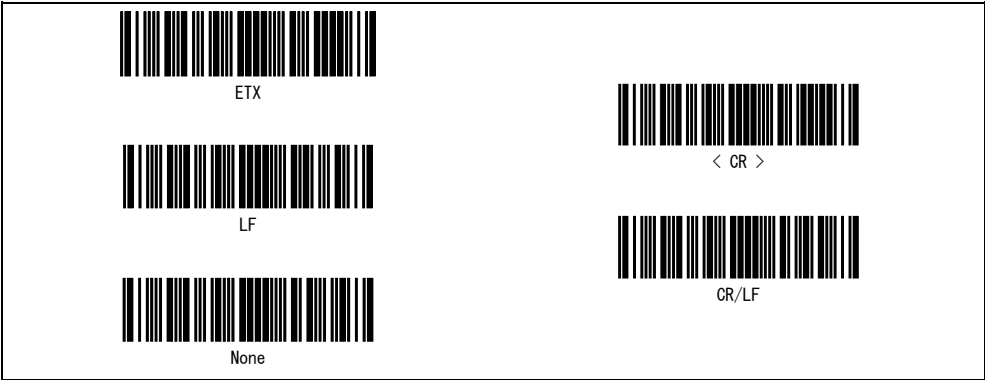
CTS signal monitoring



Header



Terminator



Transmission of BCC



■ Communications parameters for USB-COM interface

Procedure



< No protocol mode >



ACK/NAK mode

CTS signal monitoring



< Not controlled >



Controlled

Header

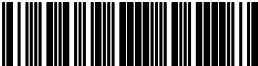


< None >

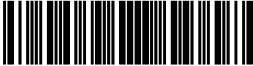


STX

Terminator



ETX



LF



None



< CR >



CR/LF

Transmission of BCC

 < Disable >	 Enable
--	---

■ Communications parameters for USB keyboard interface

Caps Lock mode



< Manual (OFF) >



Auto

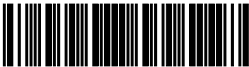


Manual (ON)

Keyboard type



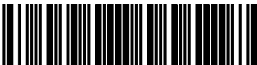
< U.S. English (101 Keyboard) >



French (102 Keyboard)



Italian (102 Keyboard)



Japanese (106 Keyboard)



Germany (102 Keyboard)

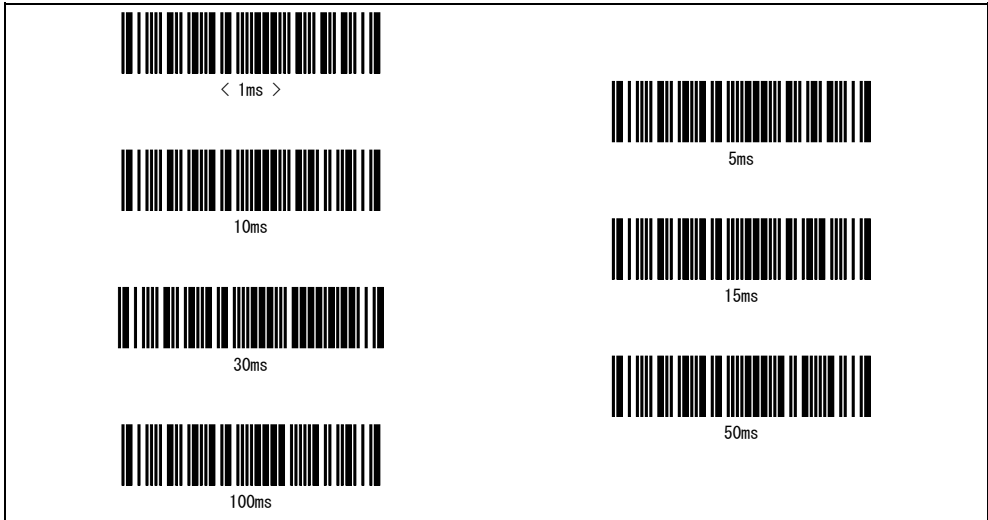


U.K. English (102 Keyboard)



Swedish (102 Keyboard)

Data trasmission interval



Numeric data transmission format



Special key transmission mode



 < None >	 STX
 ETX	 CR
 LF	 CR+LF
 TAB	 ESC
 ENTER	 Right Ctrl
 ←	 ↑
 →	 ↓

Terminator (USB keyboard interface)



None



ETX



LF



TAB



< ENTER >



←



→



STX



CR



CR+LF



ESC



Right Ctrl



↑



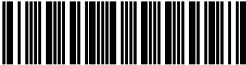
↓

■ Data transmission format

Transmission of code ID mark

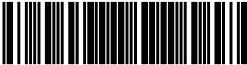


Enable



< Disable >

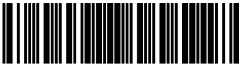
Tranmission of the number of digits



Enable in 4 digits



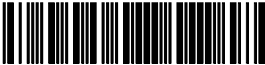
Enable in 2 digits



< Disable >

UPC-A/E and EAN-13/-8

Reading UPC-A, UPC-E, EAN-13 and EAN-8



< Enable >



Disable

Reading UPC/EAN add-on



Enable in 2-digit add-on



< Disable in 2-digit add-on >



Enable in 5-digit add-on



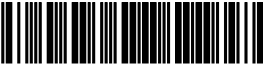
< Disable in 5-digit add-on >

Standard 2 of 5

Reading Standard 2 of 5



Enable without a check digit



Enable with a check digit



< Disable >

Check digit transmission



< Enable >



Disable

Interleaved 2 of 5

Reading Interleaved 2 of 5



< Enable without a chek digit >



Disable



Enable with a check digit

Check digit transmission



< Enable >



Disable

CODABAR (NW-7)

Reading CODABAR (NW-7)



< Enable without a check digit >



Disable



Enable with a check digit

Check digit transmission



< Enable >



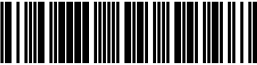
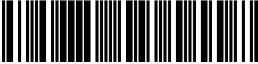
Disable

Transmission of start / stop codes for CODABAR (NW-7)

 < Transmit a/b/c/d >	 Transmit A/B/C/D
 Disable	

CODE32

Conversion from CODE39 to CODE32

 Enable	 < Disable >
---	--

Transmission of the leading “A” of CODE32

 Enable	 < Disable >
---	--

Check digit confirmation of CODE32

 Enable	 < Disable >
---	--

CODE39

Reading CODE39



< Enable without a check digit >



Enable with a check digit



Disable

Check digit transmission



< Enable >



Disable

Transmission of start / stop codes for CODE39

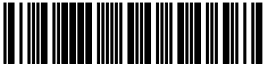


Enable

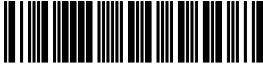


< Disable >

Conversion to CODE39 Full ASCII



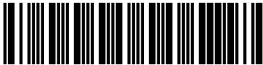
Enable



< Disable >

CODE93

Reading CODE93



Enable



< Disable >

CODE128/GS1-128(EAN-128)

Reading CODE128/GS1-128(EAN-128)



< Enable >



Disable

FNC1 transmission of CODE128



< Convert to GS before transmission >

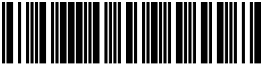


Disable

FNC1 transmission of GS1-128(EAN-128)



< Convert to GS before transmission >



Disable

MSI

Reading MSI



Enable without a check digit



Enable with a check digit(1-digit)



Enable with a check digit(2-digit)

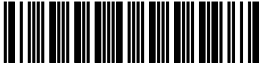


< Disable >

Check digit transmission



< Enable >



Disable

Plessey

Reading Plessey

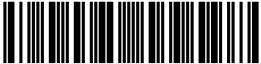


Enable



< Disable >

Reading type of Plessey



< Dual >



Single

GS1 DataBar (RSS)

Reading GS1 DataBar Omnidirectional, GS1 DataBar Truncated



Enable



< Disable >

Reading GS1 DataBar Stacked, GS1 DataBar Stacked Omnidirectional



Enable



< Disable >

Reading GS1 DataBar Limited

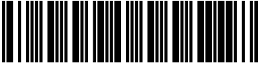


Enable



< Disable >

Reading GS1 DataBar Expanded

 Enable	 < Disable >
---	--

Reading GS1 DataBar Expanded Stacked

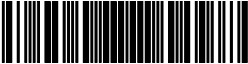
 Enable	 < Disable >
---	--

FNC1 transmission of GS1 DataBar Expanded

 < Convert to GS before transmission >	 Disable
--	--

■ Trigger switch control

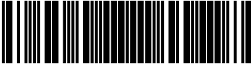
Trigger switch control



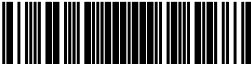
< Auto-off mode >



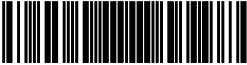
Momentary switching mode (Reverse type)



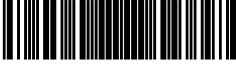
Continuous reading mode 1



Auto sensing mode



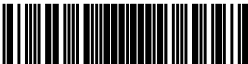
Momentary switching mode



Alternate switching mode

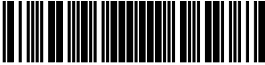


Continuous reading mode 2

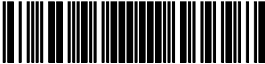


Auto stand mode

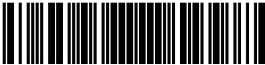
Auto-off reading mode setting



< Normal >



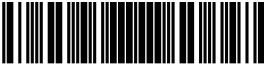
One shot 2sec



One shot 4sec



One shot 1sec

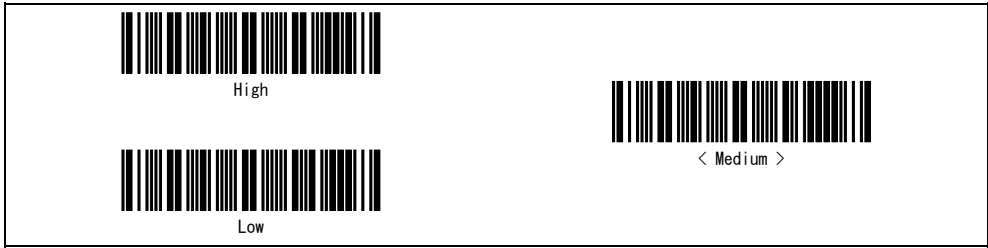


One shot 3sec



One shot 5sec

Auto sensing barcode detection level



■ Beeper/Indicator LED

Beeper control



< Enable >



Disable

Beeper frequency



Low



High



< Medium >

Beeper sound duration



Short (60ms)



Long (120ms)



< Medium (80ms) >

LED indicator



< Enable >



Disable

Chapter 12 Troubleshooting

- Trouble**
- ① Cannot scan bar codes.
 - ② Reading data is not right.
 - ③ Code data cannot be displayed normally on the computer screen.
 - ④ Even after installation of the Active USB-COM port driver, “Connected” is not shown.

■Barcode label

Trouble	Cause	Countermeasure
①②	Barcode surface dirt	Wipe the dirt from the barcode and try again.
①②	Barcode is blurred	Use a barcode clearly printed.
①	Barcode surface curvature	Read the barcode at the center of the barcode reading window.

■Reading Method

Trouble	Cause	Countermeasure
①②	Specular reflection (When the lights is focused on the printed surface of the barcode from directly above, the Scanner may not read the code due to specular reflection.)	Change the Scanner reading angle and try again.
①	Distance from barcode (Reading may be unsuccessful if the barcode is wider than the barcode reading window.)	Move the Scanner slowly toward or away from the barcode and try again.

■Setting

Trouble	Cause	Countermeasure
①	The type of the barcode to be scanned has not been set as a readable code.	Enable the type of the barcode to be scanned as a readable code.
①	The scanned barcode contains no check digit, while the “Enable, with a check digit” parameter is selected.	Select the “Enable, without a check digit” parameter.
①	The check digit contained in the scanned barcode is wrong.	Use a correct barcode.
①	Direct sunlight, ambient light	Read the barcode away from direct sunlight. Adjust the brightness of the surrounding light when reading indoors.

USB-COM interface :		
Trouble	Cause	Countermeasure
①	It is used except our Active USB-COM port driver.	Use our Active USB-COM port driver that is designed for the USB-COM interface.
①	The Active USB-COM port driver is not installed.	
③④	The USB interface is set to the USB keyboard interface.	Switch to the USB-COM interface.
②③	The communications conditions of the scanner are different from those of the connected host.	Change the communications conditions of the scanner to match those of the connected host.

USB Keyboard interface :		
Trouble	Cause	Countermeasure
②③	The keyboard type selected not match one that is set up in the host computer.	Select the same keyboard type as one that is set up in the host computer.(You can check the computer's keyboard type by clicking My Computer Control Panel Keyboard Hardware.)
②③	The Caps Lock state selected not match that of the connected keyboard.	Select the same Caps Lock state as that of the connected keyboard.
②	Any device driver other than the system-supplied driver (USB device class driver for HID) may be used.	Use the system-supplied driver.
②	The computer's keyboard is pressing.	Do not press the computer's keyboard when reading barcode.
②	The transaction speed of the application program used is slower than the transmission speed from the scanner to the host computer.	Set a longer scanner data transmission interval.

Appendix 1 Specifications

Item		AT20B-SM / AT21B-SM
Reading specifications	Readable codes	EAN-13, EAN-8, UPC-A, UPC-E, UPC/EAN with Add-on, Interleaved 2 of 5, Standard 2 of 5, Code 32, Code 39, Codabar (NW-7), Code 93, Code 128, GS1-128(EAN-128), MSI, Plessey, GS1 DataBar Omnidirectional (RSS-14), GS1 DataBar Truncated (RSS-14 Truncated), GS1 DataBar Stacked (RSS-14 Stacked), GS1 DataBar Stacked Omnidirectional (RSS-14 Stacked Omnidirectional), GS1 DataBar Limited (RSS Limited), GS1 DataBar Expanded (RSS Expanded), GS1 DataBar Expanded Stacked (RSS Expanded Stacked)
	Reading direction	bi-directionally
	Resolution	0.125mm
	Elevation angle	±50° (Note1)
	Tilt angle	±50° (Note1)
	Light source	LED (Red)
	Reading confirmation	Blue LED, Beeper
Interface		RS-232C interface, USB-COM interface, USB Keyboard interface
Input power requirements	Operating voltage	5VDC ±5%
	Power consumption (in auto-off mode)	Max.260 mA
Environmental conditions	Drip-proof	IP42 (Note3)
	Drop resistance	1.8m×6times, 1.5m×60times(each 6surface x 10times) on the concrete (Note2) (Note3) (Note4)
	Electrostatic durability	IEC61000-4-2 LEVEL Special (Note2) (Note3) (Note4) direct discharge, indirect discharge +/− 6kV
	Trigger switch operation	Operation 1,000,000 times (Note2) (Note4)
	Cable bending durability	300,000 times (Note2) (Note3) (Note4) (right and left 90° in each direction is counted as one bending)
	Extended cable strength	(static load) 49N × 1minute (Note2) (Note3) (Note4)
	Operating temperature range	-5~50 °C
	Operating humidity range	10~90% RH (Note2)
	Storage temperature range	-10~60°C
	Storage humidity range	5~95 % RH (Note2)
	Ambient illuminance range	Max. 10,000 lx
Dimensions (W) x (D) x (H)		2.5 x 6.2 x 3.2 inches (63 x 158 x 80 mm)
Weight		Approx. 105 g (excluding the interface cable)

(Note1) Under these conditions:

- EAN-13 and EAN-8 labels conforming to EAN SYMBOL SPECIFICATIONS

- Magnification ratio : 1.0, Space reflectance : 0.8, Bar reflectance : 0.1, Black bars on a white background

(Note2) Sharp temperature change, dewing or freezing not allowed, wet-bulb temperature 30°C max.

(Note3) when the interface cable connected.

(Note4) These are test values, but they are not guaranteed values.

Appendix 2 Control Commands

Control commands refer to commands that are exchanged between the host computer and the scanner via the communications line.

Some of the control commands that the host computer issues are functionally equivalent to some parameters that can be set with the Bar coded parameter menu (refer to Chapter 11). Control command settings have priority over settings made with the Bar coded parameter menu.

Note that turning off the scanner will clear control command settings so that settings made with the Bar coded parameter menu will take effect unless the PW command is sent to the scanner for saving control command settings into the FLASH ROM.

If commands other than ones listed below are sent to the scanner, the scanner operation is not assured.

Note: Selecting the USB keyboard interface disables the control commands.

Note: Until the completion of execution of a specified control command, the subsequent command will not be executed.

Note: After recognition of the virtual COM port when the USB-COM interface is used, the scanner requires a maximum of one second to be ready to receive control commands.

Control Commands	Transfer Direction	Function
	Scanner ←→ Host	
Z (Note1)	←	Reading standby
READOFF	←	Only when the trigger switch is set to continuous reading mode 1 or 2, the scanner will enter the reading standby state by receiving "Z", "READOFF" or "LOFF" command.
LOFF	←	
R (Note1)	←	Reading start
READON	←	Only when the trigger switch is set to continuous reading mode 1 or 2, the scanner will enter the reading ready mode by receiving "R", "READON" or "LON" command.
LON	←	
B1 B2 B3 (Note3) (Note4)	←	Beeper sound Beeper sounds for a specified duration within 100ms after the command is received. "B1" : Beeps for approx. 80ms, 60ms, 120ms, or 140ms. "B2" : Beeps for approx. 120ms "B3" : Beeps for approx. 240ms Beeper can be operated even if it is disabled or if the scanner is in the standby state.
BH1, BM1, BL1 BH2, BM2, BL2 BH3, BM3, BL3 (Note3) (Note4)	←	Beeper sound(tone specification) By adding a tone option to the above command, the beeper can be sounded in various tones. "H": Beeps in a high-pitch tone. (4.0 kHz) "M": Beeps in a medium-pitch tone. (3.0 kHz) "L": Beeps in a low-pitch tone. (2.8 kHz)
LB (Note3)	←	Light the blue indicator LED Within 100 ms from the receipt of the LB command, the blue indicator LED lights for approx. 500 ms.
LG (Note3)	←	Light the green indicator LED Within 100 ms from the receipt of the LG command, the green indicator LED lights for approx. 500 ms.
LR (Note3)	←	Light the red indicator LED Within 100 ms from the receipt of the LR command, the red indicator LED lights for approx. 500 ms.

Control Commands	Transfer Direction		Function
	Scanner	Host	
U1 U2 U3 U4 U5 U6 U7 U8			Trigger switch control U1 : Auto-off mode U2 : Momentary switching mode U3 : Alternate switching mode U4 : Continuous reading mode 1 U5 : Continuous reading mode 2 U6 : Auto sensing mode U7 : Auto stand mode U8 : Momentary switching mode (Reverse type)
PW (Note5)			Parameter strage The values set with commands U1 to U8 are stored in the internal FLASH ROM. If no command is issued, these values do not remain when the power is tured OFF, and original values return.
VER			Firmware version request Response from the scanner : Ver.n.nn n.nn : Version No. Example : Ver.1.00
VERF			Setting parameter version request Check the setting parameter version required to generate a batch bar code setting (when the scanner not connected) with the configuration software (ScannerSetting). Response from the scanner: er.n.nn.mm n.nn.: Firmware version No. mm: Setting parameter Version No. Example: Ver. 1.00.00
E			Scan entry remote request When performing n-point verification reading, the system enters the master code registration status and registration is performed by reading a master code. The registered master code data is stored in the EEPROM.
ID			Scanner ID (Serial number) request <Scanner response> "ID. XXXXXXXXXXXXnnnnnn" XXXXXXXXXX: fixed number, nnnnnn: serial number
TMON (Note6)			Trigger switch function enable Enables trigger switch control.
TMOFF (Note6)			Trigger switch function disable Disables trigger switch control, and scanner enters Ready state.
ERROR			Scan fail When set to Continuous reading mode 1 or 2, data is transmitted when scanner enters Ready state without completing reading in Active state. Transmission enabaled or disabled is selectable.
OK			Match Only if data output is set to "OK" when verified data matches, this command will be transmitted when data scanned matches the master code in the verification reading.

NG		Mismatch Only if data output is set to "NG" when verified data does not match, this command will be transmitted when data scanned does not match the master code in the verification reading mode.
----	---	--

(Note 1) If the scanner receives the R command twice with the reading window being applied to a code (for example, it receives the R command, sends the code data read, and receives the Z and R commands), it will send even the same code data twice. This is because the Z command cancels the duplication prevention processing.

In split Barcode reading operation, if the scanner receives the Z command and switches to standby before reading a set of split Barcode symbols, the duplication prevention processing will be canceled. The code data that has been read halfway will be discarded.

The READOFF and LOFF commands produce the same result as the Z command, the READON and LON commands, as the R command.

(Note 3) After receipt of one of the B1 to B3, BH1 to BH3, BM1 to BM3, BL1 to BL3, LB, LG, LR and VO command, the scanner may need a maximum of 100 ms to execute the command.

(Note 4) Beeping specified by control commands B1, BH1, BM1, and BL1 is dependent on the reading completion sound and its length.

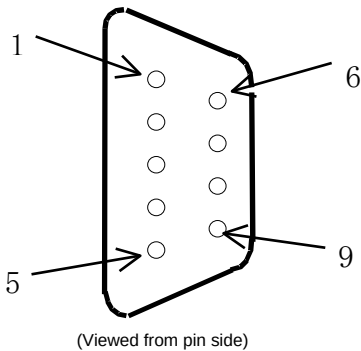
(Note 5) The PW can save settings into the FLASH ROM a maximum of 1,000,000 times due to the restrictions on the FLASH ROM.

(Note 6) These control commands are available only when the scanner is not in data verification mode.

Appendix 3 Interface Specifications

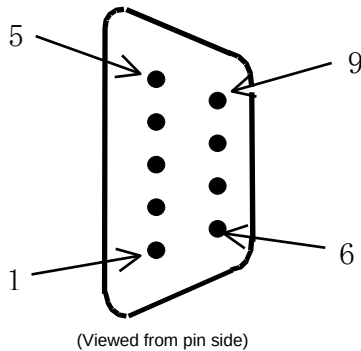
■ RS-232C interface

D-Sub 9pin socket type



	Power supplied from AC adapter	Power supplied from host
Pin #	Signal	
1	N.C.	N.C.
2	TxD	TxD
3	RxD	RxD
4	Shorted wit #6	N.C.
5	GND	GND
6	Shorted wit #4	N.C.
7	CTS	CTS
8	RTS	RTS
9	N.C.	5VDC

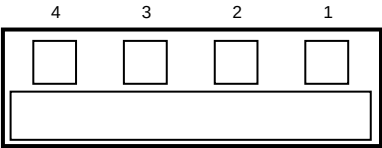
D-Sub 9pin plug type (Power supplied from host type only)



Pin #	Signal
1	N.C.
2	TxD
3	RxD
4	N.C.
5	GND
6	N.C.
7	CTS
8	RTS
9	5VDC

■ USB interface

TypeA USB connector



(Viewed from pin side)

Pin #	Signal
1	5VDC
2	D-
3	D+
4	GND

Barcode Handy Scanner

AT20B-SM

AT21B-SM

User's Manual

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